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PSYCHOPATHIC TRAITS AND THEIR RELATION TO PSYCHOPATHOLOGY IN COMMUNITY, PSYCHIATRIC OUTPATIENT AND FORENSIC PSYCHIATRIC SAMPLES OF FINNISH ADOLESCENTS

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ACADEMIC DISSERTATION

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To my family and my friends

Contents

Abstract

The construct of psychopathy is formed by a constellation of specific interpersonal, affective and behavioral character traits. In terms of interpersonal style, a prototypical psychopath is glib and superficially charming, prone to grandiose self presentation, deceit, and manipulation. His/her deficient affective experience relates to low remorse and guilt, callousness, low empathy and lack of conscience. Their lifestyle reflects a need for stimulation, a lack of long-term goals, irresponsibility, parasitic living, and impulsivity (Cleckley, 1941, Hare, 1991). Current conceptualizations view psychopathy as a developmental neuropsychological disorder (Anderson and Kiehl, 2014) and psychopathic traits on a dimensional continuum where psychopathy is a malicious version of the extremes of normal personality traits (Benning et al., 2005). Longitudinal studies have shown that psychopathic traits are relatively stable over time, from childhood through adolescence to adulthood (Frick et al., 2003; Munoz and Frick, 2007; Loney et al., 2007). Based on these findings, there has been a sharp increase in interest in applying the construct of psychopathy to children and adolescents. More research is needed, however, to improve our understanding of the manifestation of psychopathic traits in juveniles.

The aims of the present study was: 1) to study the psychometric properties of the Finnish versions of two widely used self-assessments to measure juvenile psychopathic traits, 2) to explore gender differences in self-assessed psychopathic traits in community youth, 3) to investigate the relation between self-assessed psychopathic traits and other forms of psychopathology in community youth, 4) to investigate the prevalence of limited prosocial emotions in community youth and to find out if this specifier differentiates adolescents with psychosocial problems from those without them, 5) to investigate differences in self-assessed psychopathic traits between Finnish and Dutch samples of community youth, 6) to compare self-assessed psychopathic traits between girls who are outpatients of adolescent psychiatric clinics and girls in the community, 7) to investigate how self-assessed psychopathic traits relate to psychiatric disorders in female outpatients, and 8) to assess psychopathic traits and psychopathy-related background variables in a nationwide sample of girls charged with violent offenses who

are referred to a pre-trial forensic psychiatric examination and to compare these girls to their age- and offense-matched male counterparts.

The community data comprised 370 Finnish-speaking 9th graders from five secondary schools and 155 female students from one vocational school and two high schools. Dutch community data was obtained from Dutch researchers and comprised 776 adolescents in the upper grades of two secondary schools in two rural areas of the Netherlands. The psychiatric out-patient data were collected from three municipal secondary policlinics for adolescents and consisted of 163 female psychiatric outpatients aged 15 to 17 years. The forensic psychiatric data comprised 25 girls and their age- and offense-matched male counterparts aged 15 to 17 years.

The Youth Psychopathic traits Inventory (YPI) (Andershed et al., 2002), Antisocial Process Screening Device - Self Report (APSD-SR) (Frick and Hare, 2001), Youth Self Report (Achenbach et al., 1991), and Psychopathy Checklist - Youth Version (Forth et al., 2003) were used. Further, forensic psychiatric examination reports and patient files were reviewed.

Both the YPI and the APSD-SR are promising tools to screen psychopathic features in Finnish community youth. The YPI turned out to be slightly better than the APSD-SR in both reliability and factor structure. Both self-assessments are somewhat weak at identifying the callous-unemotional traits of the psychopathic character, but, again, the YPI does better at this than the APSD-SR. Both the YPI and the APSD-SR revealed substantial gender differences in mid-adolescent community youth. Boys scored significantly higher than girls in overall psychopathic traits. Among community youth, psychopathic traits showed positive correlations with externalizing, as well as internalizing, problems. Even though boys showed higher levels of psychopathic traits and girls exhibited more general psychopathology, the correlations between psychopathic traits and other forms of psychopathology closely resembled each other.

Limited prosocial emotions turned out to be common among community youth and they did not distinguish adolescents with psychosocial problems from those without. Our cross-national comparisons revealed that culture-related differences in juvenile psychopathic traits exist. This preliminary research should obviously be replicated with other cross-national samples; if significant differences emerge, the YPI, as well as other

self-report questionnaires for psychopathic traits, might need nation-specific reference values. At present, some caution is needed in generalizing the national research findings.

Psychiatric outpatient girls exhibited more impulsive and irresponsible lifestyles than did girls in the community sample. Girls with externalizing psychopathology, unlike those with an internalizing disorder, exhibited more deficient affective experience than did girls in the community sample. Psychopathic traits were associated with also having a psychiatric disorder, a depressive disorder, ADHD and a conduct disorder. The psychiatric examination of outpatient girls would likely benefit from screening for psychopathy and its underlying components, especially among those with externalizing disorders. Approximately every third girl among those charged with serious violent offenses exhibited high traits of psychopathy. No significant gender difference in psychopathy total scores was observed. With regard to the underlying factor and item scores, girls turned out to be less antisocial, but their interpersonal relationships were more unstable. Compared to boys, girls more often had a history of child sexual abuse, and their victims were more often family members or current or ex-partners. Interventions should take into account these special features of severely violent offending girls.

Keywords: adolescence, culture, delinquency, externalizing pathology, gender, internalizing pathology, limited prosocial emotions, psychometrics, psychopathic traits

Tiivistelmä

Psykopatia-käsite muodostuu joukosta vuorovaikutukseen (lipevyys, suureellinen omanarvon tuonto, valehtelu ja manipulatiivisuus), tunne-elämään (armottomuus, heikko heikko kyky tuntea empatiaa ja tunnekylmyys) sekä käyttäytymiseen (stimulushakuisuus, impulsiivisuus ja vastuuttomuus) liittyviä luonteenpiirteitä (Cleckley, 1941; Hare, 1991). Nykykäsityksen mukaan psykopatia on kehityksellinen neuropsykiatrinen häiriö (Anderson and Kiehl, 2014) ja psykopaattiset piirteet muodostavat jatkumon, jossa psykopatia edustaa sen patologista ääripäätä (Benning ja kumppanit, 2005). Pitkittäistutkimuksen ovat osoittaneet, että psykopaattiset piirteet ovat suhteellisen pysyviä, aina lapsuudesta nuoruuteen ja aikuisuuteen (Frick ja kumppanit, 2003; Munoz ja Frick, 2007; Loney ja kumppanit, 2007). Tähän perustuen, viime aikoina psykopatia-käsite on siirtynyt enenevässä määrin aikuispsykiatriasta lastenpsykiatriaan ja nuorisopsykiatriaan. Lisää tutkimustietoa kuitenkin tarvitaan, jotta ymmärrämme, miten psykopaattiset piirteet näkyvät nuorissa ja heidän käyttäytymisessään.

Tutkimusprojektissa pyrittiin 1. tutkimaan kahden, runsaasti käytössä olleen ja nyt suomen kielelle käännetyn nuorten psykopaattisia piirteitä mittaavan itsearviointimittarin psykometrisiä ominaisuuksia nuoruusikäisessä yleisväestössä, 2. selvittämään sukupuolieroja itsearvioiduissa psykopaattisissa piirteissä nuoruusikäisessä yleisväestössä, 3. selvittämään itsearvioitujen psykopaattisten piirteiden ja psykososiaalisten ongelmien välistä suhdetta nuoruusikäisessä yleisväestössä, 4. tutkimaan DSM 5 tautiluokituksessa määritellyn käytöshäiriön alatyypin - rajoittuneet prososiaaliset tunteet - esiintyvyyttä nuoruusikäisessä yleisväestössä itsearvioituna sekä sitä, erotteleeko kyseinen alatyyppi nuoruusikäisessä yleisväestössä ne, joilla on psykososiaalisia ongelmia niistä, joilla ei kyseisiä ongelmia esiinny, 5. vertaamaan itsearvioitujen psykopaattisten piirteiden määrää ja laatua suomalaisen ja hollantilaisen nuoruusikäisen yleisväestön välillä, 6. vertaamaan itsearvioituja psykopaattisia piirteitä nuorisopsykiatriseen avohoitoon hakeutuneiden ja yleisväestöä edustavien tyttöjen välillä sekä 7. tutkimaan psykopaattisten piirteiden ja psykiatristen häiriöiden välistä suhdetta nuorisopsykiatriseen avohoitoon hakeutuneilla tytöillä, sekä 8. arvioimaan vakavaan väkivaltaan syyllistyneiden ja mielentilatutkimukseen lähetettyjen tyttöjen psykopaattisia

piirteitä ja psykopatiaan liittyviä taustatekijöitä sekä vertailemaan kyseisiä tyttöjä ikä- ja rikosnimike-vakioituihin poikiin.

Yleisväestöä edusti 370 Kokkolan kaupungin suomenkielisten yläasteiden 9-luokkalaista sekä 155 ammattikoululaista ja lukiolaista tyttöä. Hollantilainen koululaisaineisto muodostui 776 nuoresta, jotka kävivät peruskoulun yläasteen viimeisiä luokkia kahdella maaseutupaikkakunnalla. Kliininen aineisto kerättiin kolmelta kunnalliselta nuorisopsykiatrian poliklinikalta ja muodostui 163 tytöstä, jotka olivat iältään 15- 17 vuotiaita. Nuorisorikollisaineiston muodostivat 25 15-17-vuotiasta tyttöä sekä heidän poikapuoliset verrokkinsa.

Mittareina toimivat Youth Psychopathic traits Inventory (YPI) (Andershed ja kumppanit, 2002), Antisocial Screening Device- Self Report (APSD-SR) (Frick ja Hare, 2001), Youth Self Report (Achenbach ja kumppanit, 1991) ja Psychopathy Checklist-Youth Version (Forth ja kumppanit, 2003). Avohoidon potilasaineistossa psykiatriset diagnoosit kerättiin sähköisistä sairauskertomuksista ja oikeuspsykiatrisessa aineistossa mielentilatutkimuslausunnot luettiin.

Sekä YPI että APSD-SR osoittautuivat mittareiksi, joita voidaan käyttää arvioitaessa nuorten psykopaattisia piirteitä. YPI oli hieman parempi sekä reliabiliteetin että faktorirakenteensa puolesta. Molemmat itsearviointimittarit olivat jossain määrin heikkoja löytämään tunnekylmiä luonteenpiirteitä, joskin YPI toimi tässäkin suhteessa hieman paremmin. Nuoruusikäisessä yleisväestössä pojilla esiintyi enemmän itsearvioituja psykopaattisia piirteitä. Yleisväestössä itsearvioidut psykopaattiset piirteet korreloivat positiivisesti sekä eksternalisoiviin että internalisoiviin ongelmiin.

Rajoittuneet prososiaaliset suhteet olivat varsin yleisiä itsearvioituna nuoruusikäisessä yleisväestössä. Ilmiö ei erotellut nuoria, jotka kokivat psykososiaalisia ongelmia niistä nuorista, jotka eivät kokeneet kyseisiä ongelmia. Vertailu hollantilaiseen nuorisoaineistoon osoitti, että nuorten psykopaattisiin piirteisiin vaikuttavat myös kulttuuriset tekijät. Löydös tulee luonnollisesti varmentaa uusilla kansainvälisillä vertailutöillä, mutta on mahdollista, että jatkossa tarvitaan kansallisia referenssiarvoja. Tällä hetkellä lienee syytä olla varovainen yleistettäessä kansallisia tutkimustuloksia.

Avohoidon potilaat erosivat yleisväestön nuorisosta psykopaattisten piirteiden suhteen. Riskisuhteiden perusteella psykopaattiset piirteet liittyivät merkittävästi psykiatriseen häiriöön, masennustiloihin, ADHD häiriöön sekä käytöshäiriöihin.

Vaikutelmaksi muodostui, että psykopaattisten piirteiden kartoittaminen itsearviointilomakkeella on asianmukaista osana nuorisopsykiatrista tutkimusjaksoa ja erityisesti silloin, jos nuori kärsii eksternalisoivista häiriöstä. Mielentilatutkimusaineistossa joka kolmas tyttö osoitti merkittäviä psykopaattisia piirteitä, mutta sukupuolten välillä ei todettu merkittävää eroa kokonaispisteissä. Keskityttäessä mittarin faktoreihin ja yksittäisiin kysymyksiin, osoittautui, että tytöt olivat vähemmän antisosiaalisia, mutta heidän ihmissuhteensa olivat epävakaampia. Tytöillä esintyi poikia useammin seksuaalista hyväksikäyttöä lapsuudessa ja heidän uhrinsa olivat useammin perheenjäseniä, seurustelukumppaneita tai aikaisempia seurustelukumppaneita.

Avaisanat: eksternalisoiva psykopatologia, internalisoiva psykopatologia, kulttuuri, nuorisorikollisuus, nuoruusikä, psykometriikka, psykopaattiset piirteet, rajoittuneet psykososiaaliset tunteet, sukupuoli

List of original publications

I Oshukova S, Kaltiala-Heino R, Miettunen J, Marttila R, Tani P, Aronen E, Marttunen M, Kaivosoja M, Lindberg N. Self-reported psychopathic traits among non-referred Finnish adolescents: psychometric properties of the Youth Psychopathic traits Inventory and the Antisocial Process Screening Device. Child and Adolescent Psychiatry and Mental Health 2015; 9:15. DOI 10.1186/s13034-015-0047-6

II Oshukova S, Kaltiala-Heino R, Miettunen J, Marttila R, Tani P, Aronen E, Marttunen M, Kaivosoja M, Lindberg N. The relationship between self-rated psychopathic traits and psychopathology in a sample of Finnish community youth: exploration of gender differences. Journal of Child & Adolescent Behaviour 2016; 4:5. DOI 10.4172/2375-4494.1000314

III Oshukova S, Kaltiala-Heino R, Kaivosoja M, Lindberg N. Self-assessed limited prosocial emotions do not distinguish community youth with psychosocial problems from those without them. Nordic Journal of Psychiatry, published online: 14 Oct 2016. DOI 10.1080/08039488.2016.1241825

IV Oshukova S, Kaltiala-Heino R, Hillege S, deRuiter C, Joffe G, Miettunen J, Marttila R, Marttunen M, Kaivosoja M, Lindberg N. Short report: self-reported psychopathic traits in Finnish and Dutch samples of non-referred adolescents: exploration of cultural differences. Child and Adolescent Psychiatry and Mental Health 2016; 10:3. DOI 10.1186/s13034-015-0090-3

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Abbreviations

ADHD	Attention deficit hyperactivity disorder
APA	American Psychiatric Association
APSD	Antisocial Process Screening Device
APSD-SR	Antisocial Process Screening Device Self-Report
CAPP	Comprehensive Assessment of Psychopathic Personality
CI	Confidence Interval
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
COMT	Catechol-O-methyltransferase
CD	Conduct disorder
COM	Community sample
C-U	Callous-unemotional
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th revision
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th revision
DTI	Diffusion tensor imaging
EEG	Electroencephalography
EXT	Externalizing disorder
F1	Affective-interpersonal factor (factor 1) of the Psychopathy Checklist: Revised
F2	Irresponsible-antisocial factor (factor 2) of the Psychopathy Checklist: Revised
FA	Fractional anisotrophy
ICC	Intraclass correlation
ICD-8	Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, 8th revision
ICD-10	International Classification of Diseases and Related Health Problems, 10th revision
I/CP	Impulsivity/Conduct Problems
ICU-SR	Inventory of Callous-Unemotional Traits Self-Report
INT	Internalizing disorder
5-HTTLPR	Serotonin transporter linked polymorphic region gene
LPE	Limited prosocial emotions

MAOA	Monoamine oxidase A gene
NCS-A	The National Comorbidity Survey-Adolescent Supplement
ODD	Oppositional defiant disorder
OR	Odds ratio
OXTR	Oxytocin receptor
PCA	Principal Component Analysis
PCL-R	Psychopathy Checklist - Revised
PCL:SV	Psychopathy Checklist: Screening Version
PCL-YV	Psychopathy Checklist - Youth Version
PFC	Prefrontal cortex
RMSEA	Root Square Error of Approximation
SD	Standard deviation
SSRI	Serotonin Selective Reuptake Inhibitor
WHO	World Health Organization
YPI	Youth Psychopathic traits Inventory
YSR	Youth Self Report

1 Introduction

The modern concept of psychopathy can be traced to the work of Hervey Cleckley (1941), one of the pioneers in psychopathy research. He was also one of the first to raise the question regarding whether psychopathy exists in youth. In Finland, this issue was also regarded, both clinically and scientifically, as important. More than sixty years ago, child psychiatrists Törmä and Vuoristo (1950) published their follow-up study in Duodecim with the headline "A study of children treated as psychopaths in the childrens' department of Pitkäniemi mental hospital" (Törmä and Vuoristo, 1950). In this study, they described a sample of 30 children and adolescents who were hospitalized with a diagnosis of "constitutio psychopatica" between 1928-1943. Many of these under-aged patients had a family history of parental mental health and substance use problems, as well as poverty. Only fourteen of them had lived their childhood years with both biological parents. The under-aged patients typically suffered from bullying behavior, school difficulties, insincerity, and substantial self-assertion. However, with treatment, 3 patients became asymptomatic and 19 substantially improved. The researchers concluded that careful environmental study and a sufficiently long period of observation are important requirements for diagnosing psychopathy in a child.

In Finland, from the 1960s up until the 1980s, the term psychopathy was practically forgotton and it was seen as a more or less stigmatizing label (Lauerma, 2009). In 1990, the American researchers Forth, Hart, and Hare published their pioneering study called "Assessment of psychopathy in male young offenders", in which they used an adapted version of a psychopathy measurement originally developed for adults. Their study showed that psychopathic traits could also be indexed in adolescents. After this finding, psychopathy research has increased enormously in juvenile samples, not least as a consequence of new neuroimaging techniques and genetic research.

In 2013, a specifier called "with limited prosocial emotions" for conduct disorder was introduced in the fifth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM 5) (APA, 2013). The specifier is used when a child/adolescent with a conduct disorder exhibits two or more of the following characteristics: 1) lack of remorse or guilt, 2) callousness/lack of empathy, 3) lack of concern about his/her performance, and 4) shallow or deficient affect. According to the DSM-5 (APA, 2013), individuals

with conduct disorder who meet criteria for the specifier have a relatively more severe form of the disorder and exhibit a different response to treatment. Thus, the specifier allows clinicians to more accurately identify individuals who need more intensive and individualized treatment. In line with Törmä and Vuoristo (1950), who more than 65 years ago had already wisely underlined the importance of a long and careful observation time, the DSM-5 also points out that, in order to be diagnosed with the specifier, the under-aged person must exhibit the aforementioned characteristics over at least 12 months in multiple relationships or settings.

In Finland, the first dissertation focusing on juvenile psychopathic traits was published in 2015 (Saukkonen, 2015).

2 Review of the literature

2.1 Construct of psychopathy

The modern construct of psychopathy is formed by a constellation of specific interpersonal, affective and behavioral character traits. In terms of interpersonal style, a prototypical psychopath is glib and is especially superficially charming, prone to grandiose self presentation, deceit, and manipulation. His/her deficient affective experience relates to callousness, a lack of conscience, and low remorse, guilt, and empathy. Their lifestyle reflects a need for stimulation, a lack of long-term goals, irresponsibility, parasitic living, impulsivity, and a tendency to ignore or violate social conventions and mores (Cleckley, 1941 ; Hare, 1991). However, according to some researchers, it is affective and interpersonal features that comprise the "core" of the psychopathic character, while the antisocial lifestyle could be seen as a consequence of the syndrome (Cooke et al., 2004; Skeem and Cooke, 2010).

2.1.1 Psychopathy variants

Although psychopathy is often represented as a unitary construct, it shows heterogeneity with different subtypes and multiple underlying trait dimensions. Since the 1940s, two different psychopathy variants, called primary and secondary psychopathy, have been recognized. Primary psychopathy is marked by low levels of anxiety and is conceptualized as an innate or heritable affective deficit. Secondary psychopathy, on the other hand, is characterized by high levels of anxiety; it is considered to develop as a consequence of adaptation to environmental factors like maltreatment and abuse (Karpman, 1941). Primary psychopaths are characterized with a general poverty of emotional expression, and they tend to commit crimes that are fundamentally instrumental in nature, whereas secondary psychopaths show more emotional volatility, committing more impulsive, reactionary crimes (Skeem et al., 2007). Recently, preliminary findings have indicated that an antisocial personality disorder variant as well as a borderline personality disorder variant of psychopathy could be distinguished, the latter being more prevalent in females (Sprague et al., 2012).

2.1.2 Intruments to assess psychopathy

Test development for the assessment of psychopathy began in the late 1940s. However, it was not until 1980 that Robert Hare published the Psychopathy Checklist (PCL), and later its revised version (Hare, 1991). Hare's 20-item Psychopathy Checklist-Revised (PCL-R) became the gold standard for assessing adult psychopathy. It is a reliable and valid instrument (Fulero, 1998; Gacono and Hutton 1994; Grann et al., 1998; Hare et al., 2000; Stone, 1998) and its psychometric properties appear to be similar across countries (Stone, 1998). Specific scoring criteria are used to rate each PCL-R item on a three-point scale (0 = absent, 1 = possibly or partially present, 2 = definitely present) according to the extent to which it applies to a given individual. The PCL-R items are summed to yield total scores ranging from 0 to 40. Scores of 30 and higher are considered diagnostic of psychopathy (Hare, 1991).

In line with recommendations of a lower cut-off score for European populations (Cooke and Michie, 1999; Hare et al., 2000; Sullivan et al., 2006), cut-off scores ranging from 25 to 27 have often been used in studies performed in Finland (Juriloo et al., 2014; Lindberg et al., 2009; Putkonen et al., 2010, Thomson et al., 2015). A score of 20 is sometimes considered to be a cut-off for "medium psychopathy" (Woodworth and Porter, 2002). The PCL-R is underpinned by two factors that tap affective-interpersonal features (factor 1: glibness and superficial charm, grandiose sense of self-worth, pathological lying, manipulative behavior, lack of remorse or guilt, shallow affect, lack of empathy, failure to accept responsibility) and socially-deviant lifestyles and behaviors (factor 2: proneness to boredom, parasitic lifestyle, poor behavioral control, lack of realistic, long-term goals, impulsivity, irresponsibility, juvenile delinquency, revocation of conditional release). Although PCL-R scoring is recommended to be based on both a review of file information and a semi-structured interview with the offender, research has consistently shown that assessments based solely on file information are highly similar to those including an interview, and, provided that there is sufficient file information, are appropriate in the absence of an interview, especially for research purposes (Alterman et al., 1993; Grann et al., 1998; Mossman, 1994; Wong, 1988). In 1995, a screening version of the PCL-R (PCL: SV) was introduced by Hart et al. (1995).

The Comprehensive Assessment of Psychopathic Personality (CAPP) by Cooke et al. (2012) is a relatively new instrument for assessing psychopathy and its domains: Attachment, Behavioral, Cognitive, Dominance, Emotionality and Self. When it comes to self-report instruments, Hare (1980) developed the Self-Report Psychopathy Scale (SRP), the fourth version of which (SPR-IV) was recently published (Paulhus et al., 2016). The Levenson Self-Report Psychopathy Scale (LSRPS) (Levenson et al., 1995) and Psychopathic Personality Inventory (PPI) (Lilienfeld and Andrews, 1996), as well as its revised version (PPI-R) (Lilienfeld et al., 2005), are also in use.

2.1.3 Comorbidity

Findings suggest that high PCL-R scores tend to be positively associated with substance use disorders (Hart and Hare, 1989; Hildebrand and de Ruiter, 2004; Stålenheim and von Knorring, 1996). Regarding other axis I disorders, findings have been more or less contradictory (Hildebrand and de Ruiter, 2004; Laajasalo, 2009), most likely because there are various psychopathy variants, as described above (Laajasalo et al., 2009). Psychopathy is positively associated with a variety of personality disorders, especially with DSM cluster B (borderline, histrionic, narcissistic and antisocial) personality disorders (Huchzermeier et al., 2007; Stålenheim and von Knorring, 1996). In a study by Hildebrand and de Ruiter (2004), among male forensic psychiatric patients, the psychopathy diagnosis (PCL-R total score $\geq$ 30) was most strongly and significantly associated with a diagnosis of antisocial personality disorder. The link between psychopathy and antisocial personality disorder turned out to be asymmetric: most persons diagnosed as psychopaths met criteria for the diagnosis of antisocial personality disorder, whereas a minority of those with antisocial personality disorder also received a diagnosis of psychopathy. However, significant correlations between PCL-R total scores and dimensional scores of personality disorders were also found for borderline, narcissistic and paranoid personality disorders. According to Hart and Hare (1989) and Huchzermeier et al. (2007), histrionic personality disorder is also associated with psychopathy syndrome.

Indeed, many features of psychopathy syndrome overlap with those seen in personality disorders. As described, the PCL-R factor 2 (F2) score correlates strongly

with features of antisocial personality disorder. Narcissistic personality disorder and psychopathy syndrome are both characterized by grandiosity and self-centeredness. Histrionic personality disorder and psychopathy share traits of superficial charm and manipulative behavior. Like psychopathy, borderline personality disorder is characterized by impulsivity and unstable relationships. It has been suggested that paranoid personality features and psychopathy are united by callousness. On the other hand, a person whose neighborhood is associated with criminality needs to be more or less suspicious in order to survive. This necessary mode of operation might sometimes be inadvertently interpreted as pathological (Laajasalo, 2009).

2.1.4 Prevalence of psychopathy

The prevalence of psychopathy is approximately 1% in general populations, but is highly prevalent among prison populations (Coid et al. 2009). In a recent study among Finnish prisoners by Juriloo et al. (2014), approximately 12% were assessed as psychopaths, according to the original cut-off score by Hare (1991), and approximately 18%, according to the lower European cut-off scores. According to a large study by Neumann et al. (2012), both males and females from North and Central/South America and Western Europe produce substantially higher scores on the affective component of psychopathy construct than participants from Northern Europe. People from the Middle East, Africa and South/East Asia demonstrate the highest scores on the interpersonal component. With regard to the behavioral component, participants from Western Europe, Africa, and South/East Asia display the highest scores (Neumann et al., 2012). Regarding gender differences, the prevalence of psychopathy among women, assessed using the PCL-R, is generally found to be lower than among men in studies of community, forensic mental health and correctional samples (Logan and Weizmann-Henelius, 2012). It has been argued, however, that the manifestation of psychopathy differs between genders and the available measurements do not detect the female manifestation as well as the male one (Logan and Weizmann-Henelius, 2012).

2.2 Adolescence

2.2.1 Developmental tasks of adolescence

Adolescence is a transitional stage from childhood into adulthood during which an individual undergoes many physiological, psychological, cognitive, and social changes. Adolescence is initiated by pubertal onset and can be divided into three periods: early adolescence (12–14 years), middle adolescence (15–16 years) and late adolescence (17–22 years) (Blos, 1962; Richter, 1997). Each of these periods has certain developmental tasks: the achievement of biological and sexual maturity, the development of personal identity, the development of intimate sexual relationships, as well as the establishment of independence and autonomy (Christie and Viner, 2005).

During early adolescence, rapid physical changes and a reassessment of the body image occur. Early adolescents may experience impulse control problems and irritability; increased conflicts with parents and rapid changes in mood and interests are common. Changes in cognition, early moral concepts and early sexual orientation begin to occur at this age. However, adolescents are still attached to their parents and sexual fantasies are usually repressed (Sadock et al., 2004).

In middle adolescence, most girls have completed the physical changes related to puberty, whereas boys are still maturing and gaining strength, muscle mass, and height, and are completing the development of sexual traits. Mid-adolescents may become stressed over school and test scores, they seek privacy and time alone, they are concerned about their physical and sexual attractiveness, and may complain that their parents prevent them from doing things independently. They seek friends who share the same beliefs, values, and interests. They explore romantic and sexual behaviors with others. They may also be influenced by peers to try risky behaviors, such as alcohol consumption and tobacco smoking. Cognitive and moral thinking continue to develop. Youths have a better understanding of complicated problems and are better able to set goals and think in terms of the future.

In late adolescence, stable and equal intimate relationships are possible. The adolescents exhibit increased involvement in developing a personal lifestyle and moral and ethical values (Erikson, 1968). They make decisions about professional and

educational goals and leave home (Blos, 1962; Garnefski and Diekstra, 1996; Gutgesell and Payne, 2004; Steinberg and Morris, 2001).

2.2.2 Normative regression in adolescence

Development in adolescence does not proceed in a straightforward manner. Blos (1967) has postulated that regression (meaning a return to earlier developmental levels) in adolescent development is normative, universal and necessary for development to proceed. In fact, Blos concluded that lack of regression during adolescence is a sign of some "fault" in development. On the other hand, Kris (1952) pointed out that regression serves adaptation only as long as the inspirational content is ego-syntonic and large amounts of anxiety are not produced; according to Kris, an ego must be sufficiently strong for the regression to occur in the service of the ego. Normative regression is more pronounced among typically developing boys than girls (Aalberg and Siimes, 1999). Among boys, regression is most intense at the age of 13.5 and among girls, at the age of 12 (Aalberg and Siimes, 1999). Within the modern developmental literature, the psychoanalytic concept of normative regression has been regarded as somewhat problematic since developmental theories often postulate directionality in development (Kroger, 1996).

2.2.3 Brain maturation in adolescence

The brain undergoes changes throughout life within intervals of modest change, punctuated by periods of more rapid transformation (Spear, 2000). Periods of more dramatic change include prenatal and postnatal phases, as well as adolescence (Spear, 2000). The primary change seen during adolescence is a major reduction in the number of synapses. Although the implications of this massive pruning remain speculative, it is likely that during the processes of active restructuring of connections, those with a very little activity are pruned, while more mature patterns are sculpted (Casey et al., 2000). Myelination is another process that occurs during adolescence. Although certain areas of the brain, such as the visual cortex, show maturation of the myelin during childhood, myelination continues in the frontal, parietal, and temporal areas throughout adolescence (Luna and Sweeney, 2004). It is hypothesized that this myelination further contributes to

the development of executive functions of the brain by facilitating the integration of distributed brain areas and enhancing local connections (Luna and Sweeney, 2004).

Adolescence is also marked by changes in the relative volume and level of activity in different brain regions. For example, there is an increase in cortical white matter density (due to myelination) and a corresponding decrease in gray matter, especially in the frontal and prefrontal regions (Giedd et al., 1999). In the hippocampus and amygdala, gray matter volumes continue to increase during late childhood and adolescence (Giedd et al., 1999). The dorsal lateral prefrontal cortex, which controls impulses, does not reach adult size until the early 20's (Giedd, 2004).

Brain imaging studies have shown gender differences in brain maturation. Boys have significantly more gray matter than girls; the global gray matter "gender gap" widens slightly from about 11% (higher gray matter volume in boys) in young children to about 15% in older ones (Wilke et al., 2006). In girls, the overall gray matter volume is at its maximum at the age of 8.5, but in boys it is highest 2-4 years later (Lenroot et al., 2007). Regarding frontal lobes, the gray matter volume is at its maximum at the age of 11 in girls and age 12 in boys (Lenroot et al., 2007). The gray matter volume of temporal lobes is at its maximum at the age of 17 in girls and age 16 in boys (Lenroot et al., 2007).

The amygdala and basal ganglias are both related to emotion regulation. In adolescence, the relative volumes of the nucleus caudatus and gyrus cinguli are larger in girls than boys. In contrast, the relative volumes of the amygdala, globus pallidus and insula are larger in boys than girls (Wilke et al., 2006). During childhood and adolescence, relative white matter volume increases faster in boys than girls (Schmithorst et al., 2008). Greater fractional anisotropy in associative white matter regions (including the frontal lobes) has been reported in boys, while greater fractional anisotropy in the splenium of the corpus callosum was shown in girls. Further, boys showed greater mean diffusivity in the corticospinal tract and in frontal white matter in the right hemisphere. Girls, on the other hand, exhibited greater mean diffusivity in the occipito-parietal regions and the most superior region of the corticospinal tract in the right hemisphere (Schmithorst et al., 2008). These results indicate differing developmental trajectories in white matter for boys and girls.

2.2.4 Cognitive development in adolescence

2.2.4.1 Neurocognition

Neurocognitive functions are mental processes related to reception and preservation of information, and can be roughly divided into different components, such as perceptive, attentive, memory, learning, motor, and executive functions (Lezak et al., 2004). Executive functioning is a core component of self-regulation abilities including, for example, effortful attention, inhibitory control, and working memory (Lee et al., 2013). Although cognitive function develops dramatically, both qualitatively and quantitatively, from infancy into childhood, when the basic scaffold of adult cognition is in place, it continues refinement throughout adolescence (Ernst and Mueller, 2008). Reaction time shortens (Bedard et al., 2002; Williams et al., 1999), motor and cognitive inhibition improves (Bedard et al., 2002; Munoz et al., 1998; Williams et al., 1999), working memory capacity increases (Bayliss et al., 2005; Gathercole et al., 2004), computation processing expands as the number of items successfully manipulated increases (Bayliss et al., 2005), and the ability to establish rules for adaptive behavior that takes into account time estimation rises (McCormack et al., 1999). According to Luna et al. (2004), voluntary response suppression, processing speed and spatial working memory show adult-level mature performance at approximately 14, 15, and 19 years of age, respectively.

Gur et al. (2012) developed and applied a brief computerized neurocognitive battery that provides measures of performance accuracy and response time for executive-control, episodic memory, complex cognition, and sensorimotor speed domains. They tested a population-based sample of 3500 individuals aged 8–21 years. Sex differences were evident, with girls outperforming boys on attention, word and face memory, and reasoning speed, and boys outperforming girls in spatial processing and sensorimotor and motor speed.

2.2.4.2 Social cognition

Social cognition refers to the ability to make sense of the world through processing signals generated by other members of the same species (Frith, 2007) and encompasses a wide range of cognitive processes that enable individuals to understand and interact with

one another (Adolphs, 1999; Frith and Frith, 2007). These include processes like face processing, social decision-making, emotional perspective taking and mentalizing (Theory of Mind). Most developmental studies of social cognition have focused on early childhood; unfortunately, the understanding of how social cognition develops during late childhood and adolescence is still incomplete (Burnett and Blakemore, 2009). Facial processing abilities continue to improve during adolescence (Monk et al., 2003; Pfeifer et al., 2011) with some studies observing a dip in face-processing proficiency in early adolescence (Carey et al., 1980; Thomas et al., 2007).

Another important social ability, the ability to sometimes decide to ignore what others think you should do (resisting peer influence), develops during the adolescent years. Steinberg and Monahan (2007) conducted a large study in which 3600 male and female children, adolescents, and adults completed a questionnaire asking how likely they would be to do a variety of good, bad, or neutral actions based on whether other people were doing the same. It was found that self-reported resistance to peer influence increased steadily between the middle and late teens.

Emotional perspective taking (the ability to take another's perspective) in adolescence was studied by Choudhury et al. (2006). The data suggest that the efficiency, and possibly strategy, of perspective taking develops in parallel with brain maturation and psychosocial development during adolescence. Theory of mind development shows a string normative process in early childhood, although development extends through adolescence into adulthood (Andrews-Hanna et al., 2011). Ingalhalikar et al. (2014) found that females perform better than males on social cognition tests during mid-adolescence and linked the results to greater interhemispheric connectivity in female brains. In a meta-analysis by McClure (2000), a statistically significant female advantage for facial expression processing from infancy through adolescence was reported.

Moral reasoning is an important socio-cognitive skill that refers to the ability to analyze and evaluate situations in light of moral criteria in order to establish judgments about right and wrong and regulate behavior. From a neuropsychological point of view, this skill is underpinned by neural networks that combine affective, cognitive, and motivational processes (Decety and Howard, 2013). Children's moral reasoning is influenced by authoritarian figures and is rather egocentric. During late childhood and adolescence, moral reasoning improves as individuals begin to coordinate multiple

features and take into account the perspective of others. It has been demonstrated that moral reasoning continues to undergo significant development in adolescence (Burnett and Blakemore, 2009; Sommer et al., 2014). In a recent study by Chiasson et al. (2017), a linear increase in moral reasoning was identified with age from 6 to 20 years old in typically developing children and adolescents. There was a statistically significant mean difference between boys and girls across all age groups, with girls demonstrating more mature moral reasoning than their male counterparts. Age group differences were detected between early adolescence and middle adolescence, but not between middle and late adolescence, suggesting that development of moral reasoning slows after age 18, as has also been suggested by Armon and Dawson (1997).

2.2.5 Personality development in adolescence

Throughout the last two decades there has been a growing consensus on the higher order structure of personality, with a majority of researchers now agreeing that personality can be subsumed into five broad traits called the Big Five or the Five Factor Model (FFM). The Big Five traits are thought to capture the core of personality: Neuroticism (i.e., the tendency to experience stress), Extraversion (i.e., the tendency toward positive emotionality and social dominance), Openness to Experience (i.e., curiosity, creativity, and imagination), Agreeableness (i.e., helpfulness, cooperativeness, and kindness), and Conscientiousness (i.e. orderliness, responsibility, and perseverance) (Caspi et al., 2005). It has been demonstrated that the Big Five traits apply to adolescent personality in the same way that they do with adult personality (John et al., 1994). In adolescence, individuals generally become more open to experience, more extraverted, and more emotionally stable (Roberts et al., 2006). On the other hand, Agreeableness and Conscientiousness seem to stay relatively stable throughout the period of adolescence (Roberts et al., 2006). However, in a 2-year follow-up study among 12- to 18-year-old Estonian adolescents, a reliable increase was found only in Openness (Pullmann et al., 2006).

Individual differences in personality traits become more set and personality trait profiles stabilize as one ages (Klimstra et al., 2009). According to a meta-analysis by Roberts and DelVecchio (2000), estimates of mean population test-retest correlation coefficients showed that consistency increased from 0.31 in childhood to 0.54 during the

college years, and to 0.64 at age 30, reaching a plateau around 0.74 between 50 to 70 years of age.

Some gender differences in adolescent personality development seem to exist, but there is little agreement among studies. Adolescent boys have been reported to be more extraverted and open than their female counterparts (Branje et al., 2007), but also the opposite has been suggested (McCrae et al., 2002). In addition, McCrae et al. (2002) found higher levels of Agreeableness and lower levels of Emotional Stability in adolescent girls when compared to boys, whereas Branje et al. (2007) found no gender differences on these two dimensions. Personality traits seem to stabilize faster in girls than boys (Klimstra, 2013).

2.2.6 Emotional development in adolescence

As Froese (1975) concluded, adolescence is a more or less trying period emotionally. The adolescent's emotional sensitivity is partly related to the hormonal, physical and body image changes. As the adolescent attempts to become more independent, he/she withdraws from some of the emotional ties with his/her parents. This results in a temporary phase of narcissism or self-centeredness. Feelings of emptiness, loneliness, boredom and alienation follow if close peer relationships are not substituted for the previously close parental relationship. Peer pressure can lead to acting-out behavior; he/she may experiment with drugs or antisocial acts. If this acting-out is the only aspect of the adolescent's attempt to emancipate him/herself, it will likely be just a passing phase.

Adolescents experience wide fluctuations in their daily emotional states, and learning to manage these emotions is vital to their eventual effectiveness and well-being in adult roles (Larson and Richards, 1994). It has been argued that adolescents are poor decision-makers (i.e., their high rates of participation in dangerous activities, car accidents, unprotected sex). This initially led to hypotheses that adolescents had poor cognitive skills relevant to decision-making or that information about consequences of risky behavior may have been unclear to them. In contrast to those accounts, however, there is substantial evidence that adolescents engage in dangerous activities despite knowing and understanding the risks involved (Benthin et al., 1995; Martin et al., 2002). Thus, in real-life situations, adolescents do not simply rationally weight the relative risks

and consequences of their behavior – their actions are largely influenced by feelings and social influences (Steinberg, 2004). During the adolescent transition, regulatory systems are gradually brought under the control of central executive functions, with a special focus on the interface of cognition and emotion (Steinberg, 2005). Learning to manage emotions requires that teens learn to distinguish how and when emotions are functional from ways in which they can turn your world upside down, mislead, and have dysfunctional consequences (Zeman et al., 2006).

It has been speculated that the impact of puberty on arousal and motivation occurs before the maturation of the frontal lobes is complete. This gap may create a period of heightened vulnerability to problems in the regulation of affect, which might help to explain the increased potential in adolescents for risk-taking, recklessness, and the onset of emotional problems (Steinberg, 2005). During adolescence, connectivity between regions of the prefrontal cortex and several areas of the limbic system improves. This restructuring affects the ways in which individuals evaluate and respond to risk and reward (Martin et al., 2002; Spear, 2000).

From middle childhood into late adolescence, children's ability to regulate their emotions increases and emotion regulation decisions become more differentiated as a function of motivation, emotion type, and social-contextual factors (Gnepp and Hess, 1986; Zeman and Garber, 1996). Adolescents' heightened awareness of the interpersonal consequences for a particular display of emotion and changing social relationships with parents versus peers influences their decisions to express certain emotions to particular individuals (Fuchs and Thelen, 1988). For example, adolescents are more likely to express emotions when a supportive reaction is expected (Fuchs and Thelen, 1988; Zeman and Garber 1996). Finally, although social or self-conscious emotions, such as shame and pride, have already emerged in childhood, these emotional experiences increase in intensity and frequency in adolescence given adolescents' heightened sensitivity to the evaluations of others (Elkind and Bower, 1979).

2.2.7 Epidemiology of psychiatric disorders in adolescence

In adolescence, internalizing symptoms begin to rise, especially among girls (Costello et al., 2011). Boys exhibit higher prevalence rates of externalizing symptoms, but this gender gap narrows in adolescence (Hicks et al., 2007). Adolescence is a risk period for

the emergence of mental health disorders (Kessler et al., 2012). The incidence of psychiatric disorders increases from childhood through mid-adolescence and peaks in late adolescence and young adulthood (Newman et al., 1996). Carried out in the United States, the National Comorbidity Survey-Adolescent Supplement (NCS-A) is a nationally representative face-to-face survey of approximately 10,000 adolescents aged 13 to 18 years (Merikangas et al., 2010). From the survey, the lifetime prevalence of anxiety disorders, according to DSM-IV criteria, was 31.9%, behavior disorders 19.1%, mood disorders 14.3%, and substance use disorders 11.4%. In the same sample, the lifetime prevalence estimates of anorexia nervosa, bulimia nervosa, and binge-eating disorder were 0.3%, 0.9%, and 1.6%, respectively (Swanson et al., 2011).

Costello et al. (2011) systematically reviewed both cross-sectional and longitudinal studies published in the past 15 years in papers reporting prevalence rates of psychiatric disorders separately for childhood, adolescence, and early adulthood. According to their review, about one adolescent in five suffers from a psychiatric disorder. Drug abuse and drug dependence were the most common diagnosis groups (12.1%), followed by anxiety (10.7%), depressive (6.1%), and behavioral disorders (3.5%)(Costello et al., 2011). According to DSM-5 (APA, 2013), the prevalence of conduct disorder (CD) in community youth is 2.0 to 10.0%, with a mean prevalence of 4.0%. In delinquent samples, prevalence rates from 31.0 to 100% have been reported for CD (Ollendink et al., 1999; Ruchkin et al., 2003; Timmon-Mitchell et al., 1997; Vermeiren, 2003). ADHD occurs in most cultures in about 5.0% of children and about 2.5% of adults (APA, 2013). In line with this, Polanczyk et al. (2007) reported the worldwide-pooled prevalence of ADHD to be 5.3% in the population up to 18 years of age. However, according to Pastor et al. (2015), the overall prevalence of ever diagnosed with ADHD in U.S. children aged 12 to 17 years was as high as 11.8%. The prevalence of schizophrenia-related disorders in adolescence is about 1.0 to 2.0% (Kessler et al., 1994; Patel et al., 2007).

The British Child and Adolescent Mental Health Survey 1999 reported that the prevalence rate of pervasive developmental disorders was 0.2% of youths aged 11 to 15 years (Ford et al., 2003). Nothing in the literature suggests any dramatic systematic changes in overall rates of adolescent psychiatric disorders, although there is some evidence that the prevalence of CD symptomatology may have increased both among girls and boys (Collishaw et al., 2004; Costello et al., 2011).

2.3 Psychopathic traits in adolescence

In the past two decades, both clinicians and researchers have begun to expand the psychopathy construct to youth, but this expansion has been somewhat controversial (Rubio et al., 2014). One's personality undergoes substantial changes during adolescence, thus, it is problematic to label developing individuals with constructs which refer to stable abnormality. Debate has also centered on whether some of the features associated with adult psychopathy (e.g. irresponsibility, egocentricity, and impulsivity) are, in fact, normative and temporary features of youth. The term psychopathy has also been seen as stigmatizing, carrying the potential for misuse and harm when used improperly (Forth et al., 2003). On the other hand, prospective follow-up studies have shown the strong stability of this phenomenon, from childhood through adolescence to adulthood (Frick and White, 2008; Loney et al., 2007; Munoz and Frick, 2007). Further, deficits in emotionality and empathy are known to pose a great risk and challenge for adapting to society (Frick et al., 2014a; Pardini and Loeber, 2007).

Research on youth has demonstrated that psychopathic-like features designate a distinct group of juveniles who engage in particularly severe, aggressive, and persistent forms of antisocial behavior (Asscher et al., 2011). Since current conceptualizations view psychopathic traits on a dimensional continuum rather than a taxonic construct (Benning et al., 2005), the consensus is that among juveniles the terms "psychopathic traits" or "psychopathic features" are justified to use, when appropriate (Loeber et al., 2009).

In child psychiatry, and often among adolescents also, the term "callous-unemotional (C-U) traits", which underlines the salient affective-interpersonal component of the psychopathy construct, is often used. Further, as children's and early-adolescents' lifestyles are not characterized by antisocial acts, the behavioral dimension of psychopathic character traits is not yet as relevant compared to the older age groups.

2.3.1 Conduct disorder with the limited prosocial emotions-specifier

The specifier "with limited prosocial emotions (LPE)" for CD was introduced in the DSM-5 (APA, 2013). The specifier is used when a child/adolescent suffering from CD exhibits two or more of the following characteristics in multiple relationships or settings over a period of 12 months: 1) lack of remorse or guilt, 2) callousness or lack of empathy, 3) lack of concern about his/her performance, and 4) shallow or deficient

affect. According to the DSM-5 (APA, 2013), individuals with CD who meet the criteria for the specifier have a relatively more severe form of the disorder and a different treatment response. Thus, the specifier allows clinicians to more accurately identify individuals needing intensive, individualized treatment. According to studies including children and adolescents with CD, individuals with the LPE specifier have shown higher rates of aggression, ADHD, externalizing disorder symptoms, as well as global impairment, than those without the specifier (Kahn et al., 2012; Pardini et al., 2012).

2.4 Etiology of psychopathic traits in adolescents

2.4.1 Twin studies

Many recent twin studies among adolescents have reported that heritable factors have a moderate to high influence, non-shared environmental factors a small to moderate influence, and shared environmental factors little or no influence in explaining the variance in psychopathic personality (Blonigen et al., 2005; Ficks et al., 2014; Forsman et al., 2008; Larsson et al., 2006; Larsson et al., 2007; Taylor et al., 2003; Tuvblad et al., 2014; Tuvblad et al., 2015). Regarding C-U traits, approximately 40 to 78% of the variation across the population is attributable to genetic influences (Viding and McCrory, 2012a), and the stability of these traits seems to be substantially influenced by genetic factors (Blonigen et al., 2006; Forsman et al., 2008). However, in a recent Swedish preschool study by Tuvblad et al. (2016), both genetic and shared environmental factors influenced psychopathic personality traits in early childhood. With regard to gender differences, there is some support for a higher heritability of C-U traits among boys (Bezdijan et al., 2011; Fontaine et al., 2010; Viding et al., 2007). In the Swedish preschool study, however, no sex differences were found in the genetic and environmental variance components (Tuvblad et al., 2016).

2.4.2 Molecular genetics

Despite the substantial literature demonstrating the heritable component of psychopathic traits, molecular genetic studies are still scarce and the results are only indicative. Fowler et al. (2009) reported that the valine allele of the catechol-O-methyltransferase gene (COMT val/val), the low activity allele of the monoamine oxidase A gene (MAOA-L), and the short allele of the serotonin transporter linked polymorphic region gene (5-

HTTLPRs) are associated with increased C-U traits in youth with ADHD. On the other hand, in a study by Sadeh et al. (2010), the long allele of the serotonin transporter linked polymorphic region gene (5-HTTLPRl) was associated with increased C-U traits in juveniles. It has been proposed that variants of MAOA, 5-HTTLPR and COMT, together with relatively reduced amygdala responsiveness to threat, might be associated with an increased risk of psychopathy (Blair, 2013; Hariri et al., 2005; Moul et al., 2013). Moul et al. (2013) reported that functional single nucleotide polymorphisms from the serotonin receptor genes HTR1B and HTR2A were associated with C-U traits in a sample of children with antisocial behavior problems. Recently, polymorphism in the oxytocin receptor (OXTR) gene was reported to be associated with the development of psychopathic traits (Dadds et al., 2014b).

2.4.3 Epigenetics

Although a growing body of evidence points toward a genetic risk for elevated psychopathic traits, this risk is likely to act in conjunction with environmental factors. One way to shed light on gene-environmental interaction is by using epigenetic approaches. In a recent longitudinal study by Cecil et al. (2014), higher prenatal parental risk factors including maternal psychopathology, criminal behaviors, and substance use were associated with an offspring's higher OXTR methylation at birth, which, in turn, was associated with higher C-U traits in early adolescence. However, this relationship was found only in conduct disordered juveniles exhibiting low levels of internalizing problems. Among adolescents with high levels of internalizing problems, C-U traits were associated with prenatal risk factors of an interpersonal nature including intimate partner violence and family conflicts, but not with OXTR methylation. More research is obviously needed in order to get a clear picture of epigenetic mechanisms in development of psychopathic traits.

2.4.4 Neurobiological factors releted to psychopathic traits

Modern imaging techniques have enabled many interesting research findings related to the etiology of psychopathic traits. On the other hand, some old findings have been replicated in new settings. However, the overall picture is still evolving. Here, studies focusing on the most important areas of interest are reviewed.

2.4.4.1 Neurophysiological findings

Studies since the 1950s have reported that boys with conduct disorder with psychopathic traits have difficulties in maintaining normal daytime vigilance (Bayrakal, 1965; Forssman and Fray, 1953), reflected by an increase in slow-wave activity in daytime electroencephalography (EEG) (Bayrakal, 1965; Raine, 2002). Abnormal vigilance of the autonomic nervous system in youngsters with psychopathic traits is expressed by a slow resting pulse and abnormal electrodermal conductance (Raine, 2002). These neurophysiological findings support the low-arousal theory by Hare (1970), which postulates that psychopathic individuals are hypo-reactive to exciting, frightening or fear-inducing stimuli, while they also need above-average stimuli in order to increase their vigilance.

2.4.4.2 Cortical findings

The prefrontal cortex (PFC) has a central role in the regulation of aggression, as well as in the ability to delay gratification and in the other executive functions, like moral reasoning (Blair, 2007). It has long been suspected to play a role in the development of psychopathic behavior, because focal damage to the PFC has led to psychopathic-like behavior in youngsters with histories of normative behavior (Raine, 2002). In incarcerated male adolescents, psychopathic traits are associated with decreased regional gray matter volumes in the orbitofrontal cortex, as well as the bilateral temporal cortex, and the posterior cingulate cortex (Ermers et al., 2013). In female youth offenders, regional gray matter volumes were negatively related to psychopathic traits in the orbitofrontal cortex, as well as in the parahippocampal cortex and temporal poles (Cope et al., 2014).

2.4.4.3 Amygdala

The amygdala, which is located in the limbic region of the brain, has an important role in reinforcement learning and in processing emotions of fear and empathy (Blair, 2013). People with amygdala lesions have difficulties in recognizing negative emotions, in particular fear and sadness (Fine and Blair, 2000). Similar difficulties with recognition of facial expressions of fear and sadness (Blair 2001; Woodworth and Waschbusch, 2008), as well as body postures indicating fear (Muñoz, 2009), have been reported in children

and adolescents with psychopathic traits. In neuroimaging studies, the amygdala response to pictures of facial expressions of fear among youngsters with psychopathic traits has been significantly more blunted than in healthy controls (Jones et al., 2009; Marsh et al., 2008). In a study by Marsh et al. (2013), empathic pain perception was assessed as adolescents viewed photographs of pain-inducing injuries. Adolescents imagined either that the body in each photograph was their own or that it belonged to another person. Youths with psychopathic traits showed reduced activity within regions associated with empathic pain, including the amygdala, the rostral anterior cingulate cortex and the ventral striatum. Reductions in amygdala activity particularly occurred when the injury was perceived as occurring to another person. Empathic pain responses within both the amygdala and rostral anterior cingulate cortex were negatively correlated with the severity of psychopathic traits.

With empathy, two aspects can be distinguished: cognitive (the representation of the intentions and thoughts of other individuals) and affective (shared affect, emotional resonance) (Baron-Cohen and Wheelwright, 2004; Blair, 2013; Decety and Jackson, 2004). Psychopathic traits are not related to deficient cognitive empathy, but they are associated with reductions in emotional resonance (responding to the fear, sadness and pain of other people) (Blair, 2013). In autism spectrum disorders, the situation is the opposite: autistic persons have major difficulties in cognitive empathy, but less in affective empathy (Klapwijk et al., 2016). Another neurobiological impairment in youth with high psychopathic traits related to amygdala functioning is impairment in emotional learning and decision-making (Blair, 2013). This manifests in difficulties making moral judgments and in having a low capacity to connect outcomes (rewards or punishments) with stimuli.

2.4.4.4 Neural connectivity

Psychopathy has increasingly been conceptualized as a disorder of brain circuits (Insel et al., 2010). So far, only a few studies have investigated the relationship between psychopathic traits and white matter in adolescents. In a study by De Brito et al. (2011), conduct disordered boys with psychopathic tendencies showed decreased white matter concentrations in the right superior frontal lobe, right dorsal anterior cingulate, right superior temporal gyrus and left precuneus than did the boys of normal development.

Using diffusion tensor imaging (DTI) techniques, a positive association between C-U traits and mean fractional anisotrophy (FA) was observed in both the uncinate fasciculus (connects the amygdala and temporal pole with prefrontal regions) (Pape et al., 2015; Sarkar et al., 2013) and the corpus callosum (Pape et al., 2015). With regard to different dimensions of juvenile psychopathic traits, grandiose-manipulative traits were related to FA in numerous white matter tracts and C-U traits were related to the corpus callosum and corticospinal tract, but impulsive-irresponsible traits were not associated with FA in the white matter skeleton. This indicated that all three psychopathic dimensions relate differently to structural connectivity (Pape et al., 2015).

2.4.4.5 Cortisol

Cortisol is a hormone secreted by the cortex of adrenal glands. It is a peripheral marker of hypothalamus-pituitary-adrenal axis activity, which is facilitated by the amygdala (LeDoux, 2007). Cortisol is often called a stress hormone since both psychological and somatic stress increase its level in the blood. Cortisol has a natural diurnal variation with highest levels occurring in the morning and lowest levels during the night. Loney et al. (2006) reported that in a community sample of 12- to 18-year-old boys C-U traits were associated with low morning cortisol. Boys with antisocial behavior but no C-U traits did not show reduced morning cortisol levels compared with healthy controls. The same finding was replicated in a study comparing boys with early-onset CD and psychopathic traits to their healthy counterparts (von Polier, 2013).

2.4.4.6 Serotonin

Low central serotonin levels have already been associated with impulsive aggression for decades (Coccaro, 1989; Coccaro et al., 1989; Virkkunen et al., 1995). Low monoamine levels, particularly 5-hydroxyindoleacetic acid (5-HIAA; the main metabolite of serotonin) have been observed in the cerebrospinal fluid of impulsive-aggressive individuals (Brown et al., 1979; Brown et al., 1982; Linnoila et al., 1983; Virkkunen et al., 1989, Virkkunen et al., 1996). In fact, low cerebrospinal fluid 5-HIAA levels have been stated to differentiate impulsive violence from non-impulsive violence (Linnoila et al., 1983). However, serotonin is richly involved in the biology of the social behavior of human beings (Crockett et al., 2008), and it has been suggested that dysfunction of the

serotonin system may be even more broadly involved in the etiology of psychopathic traits than via impulsivity. Recently, Moul et al. (2013) explored the association between C-U traits and serum serotonin levels in a sample of 3-16-year-old boys referred for antisocial behavior problems. After controlling for age and antisocial behavior, serum serotonin levels were a significant predictor of C-U traits; levels were significantly lower in boys with high C-U traits than in boys with low C-U traits.

The administration of serotonin selective reuptake inhibitor (SSRI) citalopram and tryptophan (the natural precursor of serotonin) improves the recognition of fear (Attenburrow, 2003; Harmer et al., 2003). The finding is interesting since the amygdala response to pictures of facial expression of fear has been reported to be significantly more blunted in individuals with C-U traits than in healthy controls (Jones et al., 2009; Marsh et al., 2008). Crockett et al. (2010) checked the effects of citalopram on moral judgments and behavior in a set of moral dilemmas among healthy adult volunteers. The authors found that citalopram promoted moral judgment and behavior through harm aversion. However, the prosocial effects of citalopram were less prominent in persons with low levels of empathy than in individuals with high levels of empathy.

2.4.5 Psychosocial factors related to psychopathic traits

The best method of determining whether a psychosocial factor associates with later psychopathy is a prospective follow-up study. The Cambridge study (Farrington, 2010) is one of the most reviewed. In this survey, 411 boys from a working-class area of South London were followed from the ages of 8 to 48 years old. The boys who were studied attended six state primary schools and the most common year of birth was 1953. A variety of individual, family, and socioeconomic risk factors were indexed at the ages of 8 and 10 years old. Later, boys were interviewed at age 14, 16, 18, 21, 25, 32, and 48. Psychopathic traits were assessed using the Psychopathy Checklist: Screening Version (PCL: SV) (Hart et al., 1995) from the ages of 18 to 48 years old. In the following sections, the most substantial psychosocial risk factors for elevated psychopathic traits are discussed in the context of the Cambidge follow-up study and some other relevant studies.

2.4.5.1 Parental practices

Although Hare (1970) mainly emphasized the role of neurobiology in the development of psychopathy, he also indicated that inconsistent parental discipline, in interaction with genetic predisposition, influenced the development of psychopathy. Later, Marshall et al. (1999) reported that psychopathic prisoners significantly more often reported a history of parental neglect, poor parental supervision and poor parental discipline than did non-psychopathic prisoners. According to Larsson et al. (2008), among more than 4000 English children, negative parenting, including harsh parental discipline, was associated with both elevated C-U traits and antisocial behavior later in life. In the Cambridge study, harsh discipline in childhood was associated with a higher affective-interpersonal (F1) psychopathy factor score in adulthood. Poor supervision, on the other hand, was associated with a higher irresponsible-antisocial (F2) psychopathy factor score (Farrington et al., 2010). Having a father who never participated in the boy's hobbies or leisure activities was associated with higher F1 and F2 scores in adulthood (Farrington et al., 2010). In a nationwide Finnish study by Lindberg et al. (2009) among homicidal boys sent to a forensic psychiatric examination, boys with high traits of psychopathy (PCL-R $\geq$ 26) significantly more often had an institutional or foster home placement in childhood than boys with lower traits of psychopathy (PCL-R < 26).

2.4.5.2 Child abuse and neglect

Weiler and Widom (1996) have reported that child abuse predicts high psychopathy scores later in life. Among delinquents, high traits of psychopathy were related to a history of being abused and neglected (Campbell et al., 2004; Krischer and Sevecke, 2008). In Sweden, Lang et al. (2002) reported that boys who were abused or neglected in childhood or adolescence were more likely to have high PCL scores later in life. In the Cambridge study, physical neglect was associated with higher F1 and F2 scores in adulthood (Farrington et al., 2010). Elevated traits of psychopathy have been associated with victimization in childhood and in adolescence also in Finnish adolescents (Saukkonen et al., 2016a).

2.4.5.3 Family factors

The study by Koivisto and Haapasalo (1996) showed a correlation between broken homes and high PCL-R total scores in the offpring of those homes. In the Cambridge study, being reared in a disruptive family, as well as an environment with high parental disagreement, was associated with a higher F2 psychopathy factor score in adulthood (Farrington et al., 2010). In the study by Lindberg et al. (2009), homicidal boys with high levels of psychopathic traits (PCL-R $\geq$ 26) were significantly less likely to live until the age of 16 with both biological parents than homicidal boys with lower levels of psychopathic traits (PCL-R < 26). Also, having four or more siblings, low family income, and low social class was associated with higher F1 and F2 psychopathy factor scores, whereas poor housing conditions was only associated with a higher F2 score in adulthood (Farrington et al., 2010). Lynam et al. (2008) reported that growing up in a wealthy family protects youths against the development of psychopathy.

2.4.5.4 Criminality of near relatives

In the Cambridge study, having a convicted mother, a convicted father and delinquent siblings were all associated with higher F1 and F2 psychopathy factor scores in adulthood (Farrington, 2010). In the nationwide Finnish study (Lindberg et al., 2009), boys with high levels of psychopathic traits (PCL-R $\geq$ 26) had a parental criminal history, as well as a homicide history of near relatives, significantly more often than boys with lower levels of psychopathic traits (PCL-R < 26).

2.4.5.5 Other psychosocial factors

In the Cambridge study, attending a school with a high delinquency rate was associated with higher F1 and F2 psychopathy factor scores in adulthood (Farrington et al., 2010). Further, low popularity among classmates was associated with a higher F1 score in adulthood. In line with this, in a Swedish study by Muñoz et al. (2008), youth who scored high on psychopathic traits showed more peer relationships marked by conflict than their counterparts who scored low on psychopathic traits. According to the Cambridge study, having a young or depressed mother was associated with an offspring's higher F2 psychopathy factor score in adulthood (Farrington et al., 2010).

2.5 Psychopathic traits and maladaptation in adolescence

2.5.1 Psychopathic traits and general psychopathology

According to Sevecke and Kosson (2010), the associations of psychopathic traits and other forms of psychopathology are of interest for several reasons. First, to the extent that correlations between psychopathic traits and symptoms of other disorders are high, they raise the possibility that syndromes may reflect common or overlapping etiological factors. Alternatively, other disorders may produce symptoms that resemble psychopathic traits. Unfortunately, most researchers have studied only concurrent comorbidity. Further, most studies focusing on the relations between psychopathic traits and general psychopathology have been performed in clinical or delinquent samples. Although such samples have the advantage that they contain a higher proportion of youth with psychopathic features, they are susceptible to a form of bias commonly called Berkson's bias, which refers to the finding that comorbidity is generally higher in clinical samples and in samples selected on the basis of maladaptive functioning, such as criminal acitivity (Sevecke and Kosson, 2010). The third problem is that most of the studies investigating the relationship between psychopathic traits and other psychopathology have been performed among boys, and there is a lack of knowledge about these relationships is girls.

Elevated psychopathic traits are related to various psychiatric disorders (Sevecke and Kosson, 2010), and treatment-seeking adolescents have higher self-assessed traits of psychopathy than adolescents in the community (Javdani et al., 2011). Associations between psychopathic traits and externalizing psychopathology seem to be as strong in adolescents as in adults (Sevecke and Kosson, 2010). Current findings suggest that the association between psychopathic traits and CD is stronger than the association between psychopathic traits and ADHD, and most of the relationship between psychopathic traits and ADHD appears to be mediated by CD (Sevecke and Kosson, 2010). Oppositional defiant disorder (ODD) relates strongly to CD, and moderate correlations between psychopathy scores and ODD symptoms have been reported (Salekin et al., 2004). Substance use problems start earlier and their degree is more severe among adolescents with elevated psychopathic traits than among adolescents with low levels of psychopathic traits (Frick et al., 1994; Mailloux et al., 1997). In a clinical sample of

Swedish adolescents seeking help for substance abuse, psychopathy scores correlated positively with CD symptoms in both genders, but with ADHD symptoms only in boys (Hemphälä and Tengström, 2010).

The relation between psychopathic traits and internalizing psychopathology is much less studied (Sevecke and Kosson, 2010). Adolescent psychiatric in-patients with high traits of psychopathy have shown significantly lower levels of self-rated anxiety symptoms than those with low levels of psychopathic traits, but no significant difference was observed on depressive symptoms or eating dysfunction (Murrie and Cornell, 2000). In a study among treatment-seeking juveniles with substance abuse (Hemphälä and Tengström, 2010), the psychopathy scores correlated positively with anxiety and depressive symptoms, but only in boys. With regard to eating disorder symptoms, no significant correlations were observed in either gender.

2.5.2 Psychopathic traits and delinquency

Adolescents with elevated levels of psychopathic traits are stimulus-seeking (Frick et al., 1994), more reactive to reward than punishment (O`Brien & Frick, 1996), their attitude toward violent behavior is more positive (Pardini et al., 2003), and they are more likely to form groups that violate the social norms (Kimonis et al., 2004) than adolescents with low levels of psychopathic traits. In a recent study among Finnish adolescents, elevated traits of psychopathy have been associated with carring any type of weapon, and especially a knife (Saukkonen et al., 2016b).

Offenders with high levels of psychopathic traits typically begin their antisocial and criminal activities at a relatively young age (Forth and Burke, 1998). Their use of violence tends to be more instrumental, dispassionate, and predatory than that of other offenders (Frick et al., 2014a). They also re-offend more quickly and more often than do other offenders (Gretton et al., 2001; Långström and Grann, 2002). According to Thornton et al. (2015), psychopathic traits are associated with a greater likelihood of an adolescent to offend in groups and to be in a gang, as well as to take a leadership role in group crimes. In the study by Lindberg et al. (2009) among homicidal boys, boys with high levels of psychopathic traits (PCL-R $\geq$ 26) showed excessive violence during the index offense significantly more often than did boys with lower levels of psychopathy (PCL-R < 26).

2.6 Gender and cultural differences in juvenile psychopathic traits

2.6.1 Gender differences

Most psychopathy studies have been performed among boys and we have a minimal understanding of the concept of psychopathy as it applies to adolescent females (Schrum and Salekin, 2006). Some studies have reported higher levels of psychopathic traits among boys than girls (Frick et al., 2000; Hillege et al., 2010; Marsee et al., 2005; Salekin et al., 2001; Shrum and Salekin, 2006), but there are studies that did not find significant gender differences (Campbell et al., 2004; Cruise et al., 2003; Pardini et al., 2003; Salekin et al., 2005). Typically, higher psychopathy scores for boys than for girls emerge in community samples, while in delinquent samples fewer differences can be observed (Verona et al., 2010).

2.6.2 Cultural differences

Besides neurobiological and family-related variables, cultural and ethnic aspects also play a role in the development of psychopathic traits. Until now, only a few studies have focused on associations between culture, ethnicity and psychopathic traits. McCoy and Edens (2006) reported that African-American youth score higher on psychopathic traits than European-American youth. In a Dutch study by Veen et al. (2011), no significant differences were found in psychopathic traits between incarcerated samples of native Dutch and Moroccan immigrant boys. Among Portuguese offenders, no significant difference in psychopathic traits was observed between White Europeans and participants comprising ethnic minorities (Pechorro et al., 2015c).

2.7 Measurements of psychopathic traits in adolescence

All measurements to study psychopathic traits in adolescent populations are adapted from the original PCL measurement (Hare, 1980) designed for adults.

2.7.1 The Psychopathy Checklist-Youth Version

The Psychopathy Checklist - Youth Version (PCL-YV) (Forth et al., 2003) is a full-scale assessment tool for 13- to 18-year-old adolescents. Each of the 20 items (**Table 1**) is rated as 0 (absent), 1 (present to some degree or contradictory data), 2 (definitely present), or omitted if the information is insufficient. To aid in the scoring and

determination of each trait, the manual provides an item description and some behavioral examples. The assessment is to be rejected if it contains more than five omitted items. The total score can range from 0 to 40. There is no recommended cut-off score for the PCL-YV in clinical use, but, in research, the same cut-off scores have been used in youth as in adults. The PCL-YV items can be subscored to yield four factors: factor I or the Interpersonal factor (items: impression management, grandiose sense of self-worth, pathological lying, manipulation for personal gain), factor II or the Affective factor (items: lack of remorse/guilt, shallow affect, callous/lack of empathy, failure to accept responsibility), factor III or the Behavioral factor (items: stimulation-seeking, parasitic orientation, lack of goals, impulsivity, irresponsibility), and factor IV or the Antisocial factor (items: poor anger control, early behavior problems, serious criminal behavior, serious violation of conditional release, criminal versatility). Although PCL-YV assessments should be based on both a review of file information and a semi-structured interview, several studies have shown that it can reliably be made without the interview when sufficient file information is available (Catschpole and Gretton, 2003; Gretton et al., 2004; O,'Neill et al., 2003). The PCL-YV has showed adequate indices of internal consistency, as well as at least acceptable convergent and predictive validity, in delinquent samples (Forth and Burke, 1998; Dolan and Rennie, 2007, Pechorro et al., 2015b), as well as in clinic-referred (Toupin et al., 1996) and community (Kosson et al., 2002) samples.

Table 1. Items of the Psychopathy Checklist - Youth Version by Forth et al. (2003)

1. Impression management
2. Grandiose sense of self-worth
3. Stimulation seeking
4. Pathological lying
5. Manipulation for personal gain
6. Lack of remorse/guilt
7. Shallow affect
8. Callousness/lack of empathy
9. Parasitic orientation
10. Poor anger control
11. Impersonal sexual behavior
12. Early problem behavior
13. Lack of goals
14. Impulsivity
15. Irresponsibility
16. Failure to accept responsibility
17. Unstable interpersonal relationships
18. Serious criminal behavior
19. Serious violation of conditional release
20. Criminal versatility.

2.7.2 Self-assessments

The PCL-YV is a time-consuming method that requires rigorous training and is mainly used in the field of forensic psychiatry. Because of this, various self-assessments have been widely used to measure juvenile psychopathic traits. They are easy and fast to use, as well as cost-effective, to screen large samples. However, a lack of valid cut-off points and valid reference groups limit their use in clinical practice. Further, self-reporting always carries the risk of either under- or over-reporting the symptoms. Self-report instruments are more or less transparent, and thus, inadequate in studying, for example, offender populations (Boonmann et al., 2015; Vitacco et al., 2010).

2.7.2.1 The Youth Psychopathic Traits Inventory

The Youth Psychopathic Traits Inventory (YPI) by Andershed et al. (2002) is a self-assessment for 13- to 18-year-old adolescents, developed especially for use in community samples. In the YPI, multiple items represent each of the major core personality domains of psychopathy, according to the three-factor model of the PCL-R (Hare, 1991).

The YPI has altogether 50 statements (**Table 2**) scored on a 4-point Likert scale with response options ranging from "Does not apply at all = 1" to "Applies very well = 4"; thus, the total score of the scale can range from 50 to 200. However, the measurement has no official cut-off score. The YPI has three dimensions and 10 sub-dimensions. The Interpersonal (Grandiose-manipulative) dimension contains four sub-dimensions, each one assessed with five items: Dishonest charm (e.g., "I have the ability to con people by using my charm and smile"), Grandiosity (e.g., "I am better than everyone on almost everything"), Lying (e.g., "Sometimes I lie for no reason, other than because it's fun"), and Manipulation (e.g., "I can make people believe almost anything"). In the Affective (C-U) dimension multiple items represent Callousness (e.g., "I usually become sad when I see other people crying or being sad", reversed coding), Unemotionality (e.g., "What scares others usually doesn't scare me"), and Remorselessness (e.g., "I have the ability not to feel guilt and regret about things that I think other people would feel guilty about"). The Behavioral (Impulsive-irresponsible) dimension contains multiple items for Impulsivity (e.g., "It often happens that I talk first and think later"), Thrill-Seeking (e.g., "I get bored quickly when there is too little change"), and Irresponsibility (e.g., "I have

probably skipped school or work more than most other people"). The original YPI showed internal consistencies ranging from marginal (Callousness: Cronbach's alpha = 0.66; Unemotionality: 0.67) to acceptable and good (0.71- 0.82) (Andershed et al., 2002). Later, and with various language versions, the YPI has shown moderate to good psychometric properties both in community (Andershed et al., 2002; Declercq et al., 2009; Hillege et al., 2010; Larsson et al., 2006) and forensic samples (Dolan and Rennie, 2007; Poythress et al., 2006).

Table 2. The items of the Youth Psychopathic Traits Inventory (YPI) by Andershed et al. (2002).

1. I like to be where exciting things happen. (Thrill-seeking)
2. I usually feel calm when other people are scared. (Unemotionality)
3. I prefer to spend my money right away rather than save it. (Impulsiveness)
4. I get bored quickly when there is too little change. (Thrill-seeking)
5. I have probably skipped school or work more than most other people. (Irresponsibility)
6. It is easy for me to charm and seduce others to get what I want from them. (Dishonest charm)
7. It is fun to make up stories and try to get people to believe them. (Lying)
8. I have the ability not to feel guilt and regret about things that I think other people would feel guilty about. (Remorselessness)
9. I consider myself as a pretty impulsive person. (Impulsiveness)
10. I am better than everyone on almost everything. (Grandiosity)
11. I can make people believe almost anything. (Manipulation)
12. I think that crying is a sign of weakness, even if no one sees you. (Callousness)
13. If I won a lot of money in the lottery I would quit school or work and just do things that are fun. (Irresponsibility)
14. I have the ability to con people by using my charm and smile. (Dishonest charm)
15. I am good at getting people to believe in me when I make something up. (Manipulation)
16. I have often been late to work or classes in school. (Irresponsibility)
17. When other people have problems, it is often their own fault; therefore, one should not help them. (Callousness)
18. It often happens that I talk first and think later. (Impulsiveness)
19. I have talents that go far beyond other people's. (Grandiosity)
20. It is easy for me to manipulate people. (Manipulation)
21. I seldom regret things I do, even if other people feel that they are wrong. (Remorselessness)
22. I like to do things just for the thrill of it. (Thrill-seeking)
23. It is important to me not to hurt other people's feelings^{R}. (Callousness)
24. Sometimes I lie for no reason, other than because it is fun. (Lying)
25. To be nervous and worried is a sign of weakness. (Unemotionality)
26. If I get the chance to do something fun, I do it no matter what I had been doing before. (Impulsiveness)
27. When someone asks me something, I usually have a quick answer that sounds believable, even if I have just made it up. (Dishonest charm)
28. When someone finds out about something that I have done wrong, I feel more angry than guilty. (Remorselessness)
29. I get bored quickly by doing the same thing over and over. (Thrill-seeking)
30. The world would be a better place if I were in charge. (Grandiosity)
31. To get people to do what I want, I often find it efficient to con them. (Manipulation)
32. It often happens that I do things without thinking ahead. (Impulsiveness)
33. Pretty often I act charming and nice, even with people I don't like, in order to get what I want. (Dishonest charm)
34. It has happened several times that I have borrowed something and then lost it. (Irresponsibility)
35. I often become sad or moved by watching sad things on TV or film^{R}. (Callousness)

36. What scares others usually doesn't scare me. (Unemotionality)
37. I'm more important and valuable than other people. (Grandiosity)
38. When I need to, I use my smile and my charm to use others. (Dishonest charm)
39. I don't understand how people can be touched enough to cry by looking at things on TV or film. (Unemotionality)
40. I often don't/didn't have my school or work assignments done on time. (Irresponsibility)
41. I am destined to become a well-known, important and influential person. (Grandiosity)
42. I like to do exciting and dangerous things, even if it is forbidden or illegal. (Thrill-seeking)
43. Sometimes I find myself lying without any particular reason. (Lying)
44. To feel guilty and remorseful about things you have done that have hurt other people is a sign of weakness. (Remorselessness)
45. I don't let my feelings affect me as much as other people's feelings seem to affect them. (Unemotionality)
46. It has happened that I have taken advantage of (used) someone in order to get what I want. (Manipulation)
47. I like to spice up and exaggerate when I tell about something. (Lying)
48. To feel guilt and regret when you have done something wrong is a waste of time. (Remorselessness)
49. I usually become sad when I see other people crying or being sad^{R}. (Callousness)
50. I've often gotten into trouble because I've lied too much. (Lying)

R = reverse-coded item. Published with the permission of Professor H. Andershed

2.7.2.2 The Antisocial Process Screening Device

The Antisocial Process Screening Device (APSD) was originally developed to study 6- to 13-year-old children, but the questionnaire was further modified into a self-assessment for 13- to 18-year-old adolescents and re-named the Antisocial Process Screening Device Self-Report (APSD-SR) (Frick and Hare, 2001). It consists of 20 statements (**Table 3**) scored on a 3-point scale (0 = not at all true, 1 = sometimes true, 2 = definitely true). The total score of the scale ranges from 0 to 40, but the measurement has no official cut-off score. The developers of the APSD first identified a two-factor model, in which the first factor was labeled as an Impulsivity/Conduct Problems (I/CP) factor and the second one as a C-U factor. In a later study by Frick, Bodin and Barry (2000), both the two-factor and the three-factor model (the I/CP factor was divided into two factors, Narcissism and Impulsivity) fit the data equally well. Later, the three-factor structure gained substantial support from study findings (Dadds et al., 2005; Dong et al., 2014; Laajasalo et al., 2014; Vitacco et al., 2003). The APSD-SR has become a widely used research instrument and has demonstrated good to acceptable psychometric properties in community (Frick and Hare, 2001; Laajasalo et al., 2014; Pechorro, 2013; Wang et al., 2015) and delinquent samples (Colins et al., 2014; Vitacco et al., 2003). There has been some concern, however, about its inconsistent factor structure (Colins et al., 2014; Frick and Hare,

2001; Poythress et al., 2006; Vitacco et al., 2003; Wang et al., 2015). Moreover, the internal consistency of its Affective (C-U) dimension has been reported by some researchers (Muñoz & Frick, 2007, Poythress et al., 2006, Wang et al., 2015) to be alarmingly low.

Table 3. The items of the Antisocial Process Screening Device - Self Report (APSD-SR) by Frick and Hare (2001).

1. You blame others for your mistakes.
2. You engage in illegal activities.
3. You care about how well you do at school/work[R].
4. You act without thinking of the consequences.
5. Your emotions are shallow and fake.
6. You lie easily and skillfully.
7. You are good at keeping promises[R].
8. You brag a lot about your abilities, accomplishments, or possessions.
9. You get bored easily.
10. You use or "con" other people to get what you want.
11. You tease or make fun of other people.
12. You feel bad or guilty when you do something wrong[R].
13. You do risky or dangerous things.
14. You act charming and nice to get what you want.
15. You get angry when corrected or punished.
16. You think you are better or more important than other people.
17. You do not plan ahead or you leave things until the "last minute."
18. You are concerned about the feelings of others[R].
19. You hide your feelings or emotions from others.
20. You keep the same friends[R].

R = reverse-coded item. Published with the permission of Professor P.J. Frick

2.7.2.3 The Inventory of Callous-Unemotional Traits Self-Report

The Inventory of Callous-Unemotional Traits Self-Report (ICU-SR) (Kimonis et al., 2008) is a 24-item self-assessment designed to provide a comprehensive assessment of C-U traits (**Table 4**). The ICU-SR has three subscales: Callousness, Uncaring, and Unemotional. Items are rated on a 4-point Likert-type scale (0 = not at all true, 1 = somewhat true, 2 = very true, 4 = definitely true). The total score can range from 0 to 96, but no official cut-off score has been set. The measurement has shown good psychometric properties in both community and delinquent samples (Kimonis et al., 2008; Roose et al., 2010).

Table 4. The items of the Inventory of Callous-Unemotional Traits Self-Report (ICU-SR) (Frick 2004, Kimonis et al. 2008)

1. I express my feelings openly[R].
2. What I think is "right" and "wrong" is different from what other people think.
3. I care about how well I do at school or work[R].
4. I do not care who I hurt to get what I want.
5. I feel bad or guilty when I do something wrong[R].
6. I do not show my emotions to others.
7. I do not care about being on time.
8. I am concerned about the feelings of others[R].
9. I do not care if I get into trouble.
10. I do not let my feelings control me.
11. I do not care about doing things well.
12. I seem very cold and uncaring to others.
13. I easily admit to being wrong[R].
14. I do not let my feelings control me.
15. It is easy for others to tell how I am feeling[R].
16. I always try my best[R].
17. I apologize ("say I am sorry") to persons I hurt[R].
18. I try not to hurt others' feelings[R].
19. I do not feel remorseful when I do something wrong.
20. I am very expressive and emotional[R].
21. I do not like to put the time into doing things well.
22. The feelings of others are unimportant to me.
23. I hide my feelings from others.
24. I work hard on everything I do[R].
25. I do things to make others feel good[R].

R = reverse-coded item. Published with the permission of Professor P.J. Frick

2.8 Prevalence of psychopathic traits in adolescence

After the LPE-specifier was added to the DSM-5, research groups began to investigate its prevalence among children and adolescents. In a study by Pechorro et al. (2015a) among Portugese juveniles in detention centers, approximately every third adolescent with CD exhibited LPE. Among detained girls in Belgium, the proportion varied between 26,0 and 37,0%, depending on the method used (APSD-SR: 26,0%, YPI: 37,0%) (Colins and Andershed, 2015). In a large community sample from the United States by Kahn et al. (2012), 10,0 to 32,0% of those with CD and 2,0 to 7,0% of those without CD met the specifier threshold, depending on the informant, but in another American community-based study by Hyde et al. (2015) among children from low-income families, the prevalence of LPE was up to 40,0%. With regard to psychopathic traits, in a study by Lindberg et al. (2009), approximately every fifth homicidal boy sent to a forensic psychiatric examination scored above the cut-off score for psychopathy, according to the Nordic reference values for adults (PCL-R $\geq$ 26). Among adolescent clients of one substance use clinic in Stockholm, 9.5% of the girls and 30,0% of the boys scored 20 to

29 points on the PCL-YV, reflecting medium to high traits of psychopathy (Hemphälä et al., 2015).

2.9 Prevention and treatment of psychopathic traits

Adolescents with elevated levels of psychopathic traits are a treatment challenge: they show poor treatment compliance and a high dropout rate in mental health services (Salekin, 2010). Since C-U traits can already be detected in childhood, prevention and treatment interventions should be implemented before antisocial behavior emerges (Frick et al., 2014a). Research on effective interventions is still in its infancy, but some promising results have already been published; mostly in the fields of parental training, cognitive-behavioral therapy and family therapy (Hawes and Dadds, 2007; Kolko et al., 2009; Somech and Elizur, 2012). Also, an innovative, but so far experimental intervention, which targets the improvement of eye contact in a C-U child, has been introduced by Dadds et al. (2011, 2014a). It is based on the finding that children with high levels of C-U traits do not automatically orient to the eye region of the face, but when these children are asked to "look at the eyes" of the stimulus faces, this recognition deficit disappears (Dadds and Rhodes, 2008). Recent research, however, has suggested that adolescents with elevated levels of psychopathic traits can also benefit from psychosocial interventions that take into account their unique emotional, cognitive, and motivational styles (Frick et al., 2014b). With regard to CD, interventions with the strongest support are those that combine parental training, adolescent-focused skills training and social problem solving (Hawes, Price, & Dadds, 2014). According to White et al. (2013), among delinquents with elevated traits of psychopathy, functional family therapy proved to be effective in reducing conduct problems.

With regard to psychopharmacological treatment interventions, dextroamphetamine has been reported to increase the amygdala's response to angry and fearful facial expressions (Hariri et al., 2002). Also, an increased recognition of fear after administration of SSRIs has been reported (Attenburrow et al., 2003). It has also been suggested that atypical antipsychotics might be useful for adolescents with both CD and elevated traits of psychopathy (Blair, 2013). All these findings must be regarded as indicative, however, because no randomized controlled trials or even controlled trials related to pharmacotherapy of adolescents with high levels of psychopathic traits have

been performed. It is also important to remember that dextroamphetamine, like all amphetamines, has the potency for abuse and dependence, especially among stimulus-seeking individuals.

2.10 Summary of the literature review

According to the current conceptualization, psychopathy is a constellation of specific interpersonal, affective and behavioral character traits. The prototypical psychopath is glib and superficially charming, prone to grandiose self-presentation, deceit, and manipulation. His/her deficient affective experience relates to callousness, a lack of conscience, and low remorse, guilt, and empathy. Their lifestyle reflects a need for stimulation, a lack of long-term goals, irresponsibility, parasitic living, impulsivity, and a tendency to ignore or violate social conventions and morals (Cleckley, 1941; Hare, 1991).

In the past two decades, both clinicians and researchers have begun to expand the psychopathy construct to youth, but this expansion has been somewhat controversial (Rubio et al., 2014). The consensus is that among juveniles the terms "psychopathic traits" or "psychopathic features" are justified to use, when appropriate (Loeber et al., 2009). In child psychiatry, and often also among adolescents, the term "C-U traits", which underlines the salient affective-interpersonal component of the psychopathy construct, is often used; the specifier "with limited prosocial emotions (LPE)" for CD was introduced in the DSM-5 (APA, 2013).

Regarding etiology, vulnerability for developing psychopathic personality is moderately to strongly heritable (Blonigen et al., 2005; Ficks et al., 2014; Forsman et al., 2008; Larsson et al., 2006; Larsson et al., 2007; Taylor et al., 2003; Tuvblad et al., 2014; Tuvblad et al., 2015). For C-U traits, approximately 40 to 78% of the variation among the population is attributable to genetic influences (Viding and McCrory, 2012a). Abnormal vigilance of the autonomic nervous system, as well as abnormal neural functioning in brain areas involved in affective processing, reinforcing learning, and moral judgment (e.g., the amygdala, cortex and brain circuits)(Blair, 2013), seem to be neurobiological findings specific for the psychopathic personality. Also, low cortisol levels (Loney et al, 2006, von Polier, 2013) and serotoninergic abnormalities (Attenburrow, 2003; Harmer et al., 2003, Crockett et al., 2010) are considered to

contribute to the development of psychopathy. A variety of individual, family, and socioeconomic risk factors for elevated psychopathic traits, including inconsistent parental discipline, poor supervision, broken families, and victimization in childhood, have been revealed in follow-up studies (Farrington, 2010; Larsson et al., 2008; Saukkonen et al., 2016a).

Elevated psychopathic traits are related to various psychiatric disorders (Sevecke and Kosson, 2010). Associations between psychopathic traits and externalizing psychopathology seem to be as strong in adolescents as in adults (Sevecke and Kosson, 2010). The relationship between psychopathic traits and internalizing psychopathology is much less studied, and study findings are diverse (Sevecke and Kosson, 2010). In adults, psychopathy is positively associated with a variety of personality disorders, especially with those of DSM cluster B (Huchzermeier et al., 2007; Stålenheim and von Knorring, 1996). On the other hand, many features of psychopathy syndrome overlap with those seen in personality disorders.

Offenders with high levels of psychopathic traits typically begin their antisocial and criminal activities at a relatively young age (Forth and Burke, 1998). Their use of violence tends to be more instrumental, dispassionate, and predatory than that of other offenders (Frick et al., 2014a). They also re-offend more quickly and more often than other offenders (Gretton et al., 2001; Långström and Grann, 2002).

Most psychopathy studies have been performed among boys, thus, we have a limited understanding of the concept of psychopathy as it applies to adolescent females (Schrum and Salekin, 2006). Some studies have reported higher levels of psychopathic traits among boys than girls (Frick et al., 2000; Hillege et al., 2010; Marsee et al., 2005; Salekin et al., 2001; Shrum and Salekin, 2006).

Cultural and ethnic aspects seem to play a role in the development of psychopathic traits, but only a few studies have focused on associations between culture, ethnicity and psychopathic traits until now.

Regarding measures of psychopathy, Hare's 20-item Psychopathy Checklist-Revised (PCL-R) became the gold standard for assessing adult psychopathy (Hare, 1991). All measurements to study psychopathic traits in adolescent populations are adapted from the original PCL (Hare, 1980). The Psychopathy Checklist - Youth Version (PCL-YV) (Forth et al., 2003) is a full-scale assessment tool for 13- to 18-year-old

adolescents. It is, however, a time-consuming method used mainly in forensic psychiatry. Various self-assessments have been used to measure juvenile psychopathic traits. They are easy, fast to use, and cost-effective to screen large samples. However, a lack of valid cut-off points and valid reference groups, as well as the risk of either under- or over-reporting the symptoms, limit their use in clinical practice.

Adolescents with elevated levels of psychopathic traits are a treatment challenge: they show poor treatment compliance and a high dropout rate in mental health services (Salekin, 2010). Identifying youngsters with such traits as early as possible is important, because, though the traits seem to be stable over time, environmental factors can, to some extent, influence the direction of development trajectories for the affective deficits and other psychopathic traits. Thus, proper treatment and prevention interventions should be started for such youth, before the maturation of brain structures such as the amygdala, frontal lobes and brain connectivity are completed and before antisocial behavior emerges (Frick et al., 2014a). Some promising results have already been published, mostly in the fields of parental training, cognitive-behavioral therapy and family therapy (Hawes and Dadds, 2007; Kolko et al., 2009; Somech and Elizur, 2012). Also, an innovative, but thus far experimental, intervention, which targets the improvement of eye contact in a C-U child, has been introduced by Dadds et al. (2011, 2014a).

In Finland, the first dissertation focusing on juvenile psychopathic traits was published in 2015 (Saukkonen, 2015). Using the data from the Finnish Self-Report Delinquency Study 2012 (FSRD 12), the author assessed the factor structure and internal consistencies of the APSD-SR in a community sample of 15- to 16-year-old youth (N=4,855, 51.0% girls) and concluded that the self-report version of APSD is a promising screening tool for measuring psychopathic-like features in community youth. Further, Saukkonen examined different types of weapon carrying and the relationship between victimization experiences and psychopathic-like features among youth using the same community data. Results suggested that psychopathic traits are strongly related to a higher risk of weapon carrying, and that victimization was related to psychopathic-like features in youth, in girls more strongly than boys (Saukkonen, 2015).

3 Aims of the study

The aim of the study project was to investige psychopathic traits and their relation to general psychopathology in community, psychiatric outpatient and forensic psychiatric patient samples of Finnish adolescents. More specifically, the aims were to explore:

1. Psychometric properties of the Finnish versions of two psychopathy self-assessments (the Youth Psychopathic Traits Inventory and the Antisocial Process Screening Device Self-Report) (I).
2. Gender differences in self-assessed psychopathic traits in community youth (I).
3. Relationships between self-assessed psychopathic traits and other forms of psychopathology in community youth (II).
4. The prevalence of self-assessed limited prosocial emotions in community youth and to find out if this spesifier distinguishes adolescents with psychosocial problems from those without (III).
5. Differences in self-assessed psychopathic traits between Finnish and Dutch youth in the community (IV).
6. Self-assessed psychopathic traits in female adolescent psychiatric outpatient and to compare these traits between them and girls in the community (V).
7. How self-assessed psychopathic traits relate to psychiatric disorders in female psychiatric outpatients (V).
8. Psychopathic traits and psychopathy-related background variables in a nationwide sample of girls charged with violent offenses and referred to a pretrial forensic psychiatric examination and to compare these girls to their age- and offense-matched male counterparts (VI).

4 Methods

4.1 Study design

The study project was performed between 2013-2017. A flow chart of the study project is presented in **Figure I** (page 57).

4.2 Participants

4.2.1 Community data (I-V)

The community data was collected in Kokkola, Finland - a town of approximately 47,000 citizens, 84.0% of whom speak Finnish, 13.0% Swedish and 3.0% some other language as their mother tongue. The original sample comprised all Finnish-speaking adolescents attending the ninth grade at five secondary schools in Kokkola in January 2014. Of the possible 446 pupils, 60 (13.4%) either did not attend school on the study day or refused to participate. The mean age of the 386 participants, of whom 201 (52.1%) were girls, was 15.10 years (SD 0.28). There were some participants who were excluded because they did not reveal their background information (age and/or gender) or because of too many missing items on the study questionnaires (see chapter entitled Statistical analysis in page 61). Thus, the number of participants differs slightly from study to study (this is described in detail in **Figure 1**). In May 2016, a new community sample was collected in Kokkola from two Finnish-speaking high schools and a vocational school. In this phase, only girls were asked to participate and only one self-assessment was used. Of 177 eligible students, 20 did not participate (due to not attending school on the study day or refusing to participate) and 2 did not complete the self-assessment. Thus, the sample comprised 155 girls whose mean age was 16.50 years (SD 0.53). In study V, the schoolgirls from secondary, vocational and high schools were pooled together in order to create a large female community sample.

4.2.2 Community data from the Netherlands (IV)

Dutch data were delivered by research colleagues from the Netherlands. The initial sample comprised altogether 776 adolescents in the upper grades of two secondary schools in two rural areas of the Netherlands in 2005. However, 36 adolescents (4.6%) did not complete the questionnaire. From 740 juveniles, those of foreign origin (n=74,

10.0%), as well as those who were younger than 15 or older than 16 (n=238, 32.2%) were removed from the sample before the cross-national comparisons. Thus, the final sample included 474 adolescents, of whom 253 (53.4%) were girls. The mean age of the sample was 15.40 (SD 0.49). For details, see Hillege et al. (2010).

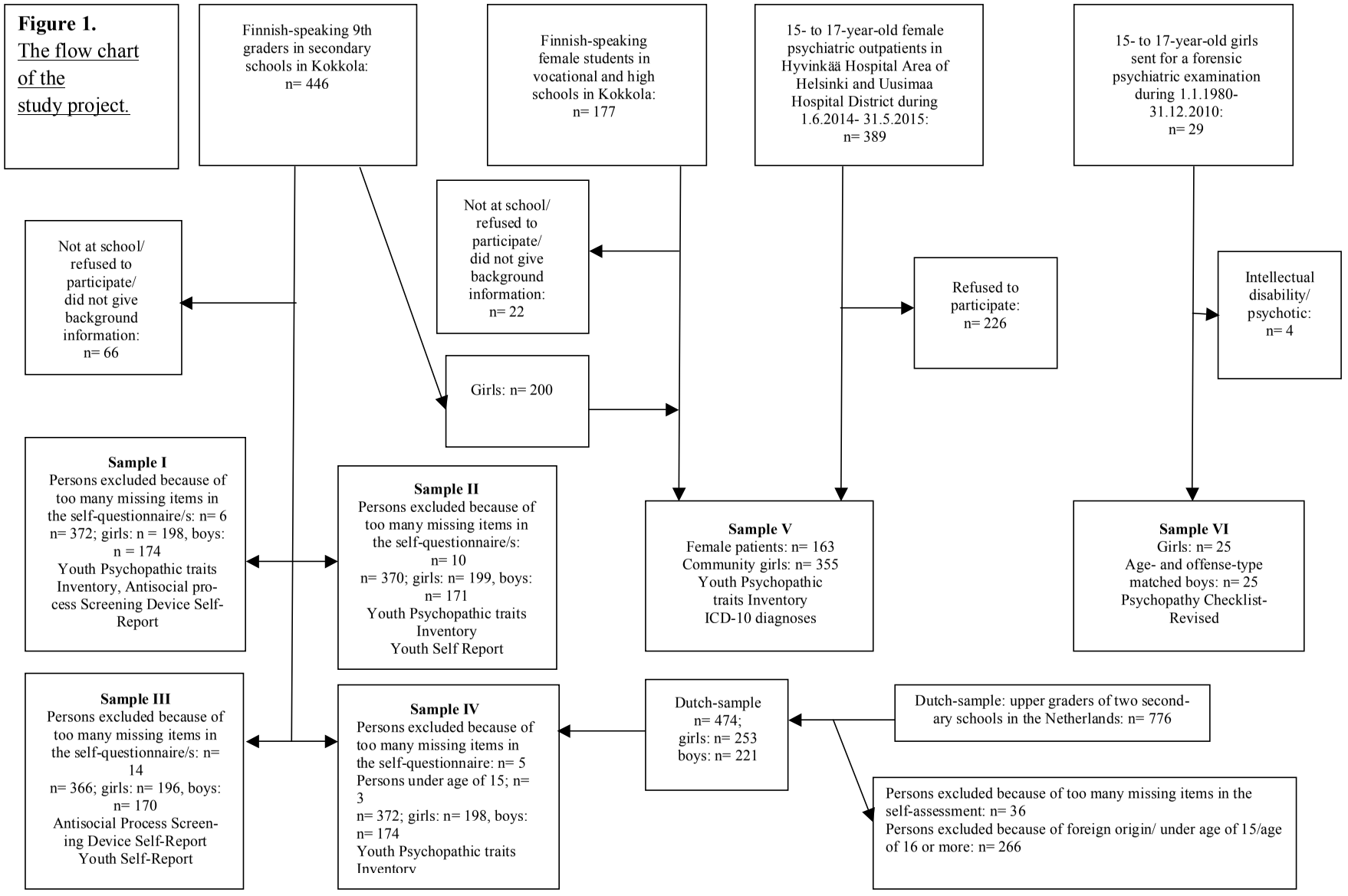
4.2.3 Psychiatric outpatient data (V)

The data were collected in the Hyvinkää hospital area of the Helsinki and Uusimaa hospital district. This area comprises approximately 180,000 inhabitants and has altogether three municipal psychiatric outpatient clinics for the adolescent population. This study comprised all 15- to 17-year-old girls who visited these clinics between 1 Jan 2014 – 31 May 2015. During this one-year study period, the total number of female outpatients was 389, of whom 163 (41.9%) participated in the study. The mean age of the participating girls was 16.00 (SD 0.86).

4.2.4 Forensic psychiatric data (VI)

Forensic psychiatric examination reports of all 15- to 17-year-old offenders who had undergone a forensic psychiatric examination between 1980-2010 were collected from the archives of the National Institute of Health and Welfare (n=266). Of this sample, 29 (10.9%) were girls. Four girls and 21 boys suffered from intellectual disability or a psychotic disorder (mainly schizophrenia) and were excluded since it is questionable whether a youngster with abnormally low IQ or acute symptoms of psychosis can be scored with the PCL-YV. The remaining 25 girls, with a mean age of 16.30 (SD 0.74), were all native Finns charged with violent offenses including murder (n=5), attempted murder (n=4), manslaughter (n=2), attempted manslaughter (n=7), aggravated assault (n=2), arson (n=3), and violent robbery (n=2). Twenty-one girls were diagnosed with CD or a personality disorder, but four girls had no psychiatric disorder. For each girl, an age- and offense type-matched male control of Finnish origin was randomly selected from the national data.

Figure 1.
The flow chart of the study project.



4.3 Measurements

4.3.1 The Youth Psychopathic Traits Inventory (YPI) (I, II, IV, V)

The YPI was translated into Finnish by members of the research team. Translation was performed from the English version of the YPI, according to the recommendations of the developers (http://www.oru.se/jps/downloadYPI/). The adolescents completed the YPI during their ordinary school lessons (students) or during their visits to policlinics (outpatients). According to the original article (Andershed et al., 2002), in order to achieve better interpretability across dimensions, the averaged scores were used. In studies I and IV, like in a previous study by Hillege et al. (2010), the sub-dimension scores were calculated by summing up the item scores of the respective sub-dimension and dividing this sum by the number of items. With regard to dimension and total scores, corresponding item scores were summed up and then divided by the number of contributing items. Finally, these numbers were multiplied by the number of sub-dimensions comprising the dimension. Thus, the range for the total score was 10-40, 4-16 for the Interpersonal (Grandiose-manipulative) dimension score, and 3-12 for both the Affective (C-U) and the Behavioral (Impulsive-irresponsible) dimension scores. In studies II and V, the scores were calculated in the same way as in studies by Andershed et al. (2007), Seals et al. (2012) and Skeem and Cauffman (2003): by summing up the item scores of all the items comprising a dimension and then dividing the sum score by the number of those items. Thus, the range for dimensional and total scores was 1-4.

4.3.2 APSD-SR (I, III)

The authorized Finnish translation of the APSD-SR (Laajasalo et al., 2014) was used. According to Laajasalo et al. (2014), this self-assessment is an instrument applicable to Scandinavian youth. In the factor analysis, three conceptually meaningful and psychologically interpretable factors were obtained, resembling those reported earlier with the original English version (Frick et al., 2000; Vitacco et al., 2003). Further, internal consistency indices for all subscales were within acceptable range. In the present study, the APSD-SR was completed during the school lessons, together with the YPI. In statistical analyses, the averaged scores were used. On the dimensional level, the contributing item scores were summed up and this sum was divided by the number of

items, so the range for a dimension score was 0-2. To get the average total score, item scores were summed up and this sum was divided by the number of items, and, finally, this number was multiplied by three (= number of dimensions). In this way, the range for the total score was 0-6.

4.3.3 Youth Self Report (YSR) (II, III)

The pupils' subjective maladaptive behavior was assessed using the YSR, which is a self-questionnaire administered to 11- to 18- year-old adolescents (Achenbach and Rescorla, 2001). The instrument was translated into Finnish by Professor F. Almqvist in 2002. The YSR contains two parts: the problem section and the competence section. In this study project, only the problem section with 112 problem items was used. These items focus on respondents' emotional and behavioral functioning during the preceding 6 months. All items are short sentences/statements worded in the first person to be answered on a 3-point scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true). Eight syndrome scales (Anxious/Depressed, Withdrawn/Depressed, Somatic complaints, Social problems, Thought problems, Attention problems, Rule-breaking behavior, and Aggressive behavior), two broadband scales (the Internalizing scale, which comprises the dimensions Anxious/Depressed, Withdrawn/Depressed, and Somatic complaints, and the Externalizing scale, which comprises the dimensions Rule-breaking behavior and Aggressive behavior) and a Total Problems score can be derived. Norms for the scale scores, in terms of percentiles and normalized T-scores, are based on national samples of youth who did not receive mental health or substance use treatment or special education services during the past 12 months (Achenbach and Rescorla, 2001). In the present study, sum scores were manually calculated, but they were not categorized according to the recommended cut-off levels. The YSR has shown satisfactory psychometric properties, and it is widely used to assess emotional and behavioral problems among youth (Doyle et al., 2007; Van Meter et al., 2014).

4.3.4 PCL-YV (VI)

The original English version of the rating scale and manual (Forth et al., 2003) was used. The file-based scoring was done by one officially-trained rater. Twenty reports (40%) were randomly chosen and rated by one independent male rater. The inter-rater

agreement was measured by means of intraclass correlation (ICC); all correlations were significant ($p < 0.001$). The ICC scores were the following: PCL-YV total = 0.886, factor 1 = 0.748, factor 2 = 0.890, factor 3 = 0.868, and factor 4 = 0.844.

4.3.5 Forensic psychiatric examination reports (VI)

Forensic psychiatric examinations are inpatient evaluations, which last approximately two months. During this period, data is gathered from various sources; psychiatric and somatic evaluations and standardized psychological tests are performed. A multi-professional team conducts interviews and the pretrial offender is observed by the hospital staff. The forensic psychiatric examination report reviews the life history of the offender in detail, and also includes an opinion on the level of criminal responsibility, a possible psychiatric diagnosis, and an assessment as to whether or not the offender fulfils the criteria for involuntary psychiatric care. The overall quality and reliability of these examinations have proven to be high (Eronen et al., 2000).

The following data concerning the delinquents first 12 years of life were gathered from the forensic psychiatric evaluation reports: parents' divorce, mother's and/or father's substance and/or psychiatric problems, witness to and/or subject of physical violence in childhood home, more than four children in the childhood family, institutional/foster home placement, subject of sexual abuse, mental health services use, client of social services, mother's and/or father's criminality, delinquency of siblings, and homicide history of parents or near relatives. Moreover, school performance in primary and secondary schools was focused on and the following variables were collected: failure to pass a grade and attending special education. Collected offense-related variables included: a history of previous offending, a history of violent offending, current alcohol use disorder, intoxication during the index crime, more than one offender involved, more than one victim involved. The victim-offender relationship was evaluated with the following options: victim was a family member/ intimate/ ex-intimate/ acquaintance/ stranger. It was also evaluated if the index offense was characterized by instrumental violence.

All items were rated categorially as either 1 (= present) or 0 (= absent). After the rater coded all the cases, 20 (40%) randomly selected reports were coded by an independent male rater in order to ensure that variables were unambiguous enough to

guarantee reliable subjective interpretations of their presence/absence. According to Landis and Koch (1977), all variables showed substantial (Cohen's kappa: 0.61–0.80) or almost perfect (Cohen's kappa: 0.81–1.00) agreement.

4.3.6 Psychiatric diagnoses (V, VI)

In Finland, psychiatric classification according to the International Classification of Diseases - Eighth Revision (ICD-8) (WHO, 1965) served in clinical practice between 1968 and 1986 and was replaced by the DSM-III-R (APA, 1987), which was used between 1987 and 1995. Since 1996, ICD-10 (WHO, 1992) has been in use.

In study V, the psychiatric diagnoses were collected from the patient files. Since comorbidity is prevalent among adolescent samples, the priority of assessed diagnoses was discussed with the treating psychiatrists, and the principal diagnoses were used in the analyses.

In study VI, diagnoses were gathered from the forensic psychiatric examination reports.

4.3.7 Assessment of limited prosocial emotions (LPE) (III)

Individuals were identified as meeting the LPE-specifier symptom threshold if they scored 2 (= definitely true) on at least two of the four APSD-SR items corresponding to the four DSM 5 LPE-specifier criteria. The APSD-SR items were:

item 12 "You feel bad or guilty when you do something wrong" [reverse coding]
item 18 "You are concerned about the feelings of others" [reverse coding]
item 19 "You hide your feelings or emotions from others"
item 3 "You care about how well you do at school/work" [reverse coding]

4.4 Statistical analyses

4.4.1 Missing items

If more than 2 items were missing for a sub-dimension (YPI), a dimension (APSD-SR), or a symptom scale (YSR), the form was excluded from further analyses. The APSD-SR and YSR item scores both range from zero to two (0-1-2). In cases of single missing items, the index item was scored as 1. The item scores of the YPI range from one to four

(1-2-3-4), and, in cases of single missing items, the most prevalent score of the index item among the study population was applied.

4.4.2 Internal consistency

In order to evaluate the internal consistencies of the self-assessments, we calculated Cronbach's alphas (I, II, III, IV, V). Reliability coefficients of < 0.60 were interpreted as insufficient, 0.60 - 0.69 as marginal, 0.70 - 0.79 as acceptable, 0.80 - 0.89 as good, and ≥ 0.90 as excellent (Cohen, 1992).

4.4.3 Group comparisons

Both the school data and the outpatient data were skewed to the right. In studies I, III and IV, non-parametric tests were used to compare the groups, whereas in studies II and V, logarithm transformation was done, enabling parametric testing. The Mann-Whitney U-test (I, IV), the likelihood ratio Chi-square (χ^2) test and Fisher`s exact test (III, VI), the independent samples t-test (II, VI), as well as one-way ANOVAs (V) were used for group comparisons, when appropriate. In study VI, a multivariate analysis (MANOVA) across the four factors of the PCL-YV was performed. The findings were considered significant when the two-tailed $p < 0.05$.

4.4.4 Effect sizes and post-hoc testing

The coefficients Phi (φ) (III, VI), Cohen's d (d) (I, III, IV, V, VI) and Theta (Θ) (III) were used to estimate the effect sizes of the differences. The magnitude of φ was interpreted as follows: < 0.3 as small, 0.3 – 0.5 as moderate, and > 0.5 as large; the magnitude of d as follows: 0.2 - 0.5 as small, 0.5 - 0.8 as medium, and > 0.8 as large; and the magnitude of Θ: < 0.56 as small, 0.56 - 0.70 as moderate, and > 0.70 as large (Cohen, 1992). In study II, the Benjamini-Hochberg procedure was performed in order to control for the false discovery rate. In study V, the Tukey method was used for post-hoc testing.

4.4.5 Correlations

In study I, Spearman correlations were calculated. In study II, Pearson correlations were calculated. As recommended (Cohen, 1992), both Spearman's rho and Pearson's r from 0.1 to 0.3 were considered as small, from 0.3 to 0.5 as moderate, and > 0.5 as high. In study II, Fisher's z transformation was used to evaluate the magnitudes of gender differences between the correlations.

4.4.6 Logistic regression analysis

In study V, associations between the psychopathy scores and psychiatric disorders were analyzed with logistic regression analysis. The YPI scores of the community youth served as a baseline. Since the minimum of the YPI mean scores was 1 and the maximum 4, a three-point Likert-type scale was created: 1 (including mean values <2), 2 (including mean values from 2-3), and 3 (including mean values >3). Thus, the logistic regression analysis revealed the risk to have a psychiatric disorder (any psychiatric disorder, a depressive disorder, an anxiety disorder, an eating disorder, ADHD, a conduct disorder, an internalizing disorder, an externalizing disorder) as a consequence of a 1-point increase on this Likert-type scale. For odds ratios (ORs), 95% confidence intervals (CI) were calculated.

4.4.7 Factor structure

In study I, the Confirmatory Factor Analysis (CFA) was performed with the Mplus 7 statistical software (Muthen and Muthen, 2012). To check the fit of the model to the data, the Chi-square test, the Comparative Fit Index (CFI), and the Root Square Error of Approximation (RMSEA) were performed. CFI values > 0.90 indicated a reasonably good fit, and, in RMSEA, values < 0.06 indicated an acceptable model fit. Because the fits assessed using the CFA were not adequate, a Principal Component Analysis (PCA) with oblique Promax rotation was performed to explore the factor structure of the YPI and APSD-SR. For both self-assessments, the number of factors was checked using the Kaiser criterion (i.e., eigenvalues > 1) and a screen plot. Loadings of 0.30 or higher were considered significant (Kline, 2002).

Regarding studies that involved both genders (I, II, III, IV, VI), descriptives and correlations were analyzed separately for girls and boys. In studies II and V, age was controlled for. All statistical analyses were performed with IBM SPSS Statistics version 19 (I) or 22 (II, III, IV, V, VI).

4.5 Ethics

The Ethics Committee of the Helsinki and Uusimaa Hospital District evaluated the study plan, and the school administrations, Helsinki and Uusimaa hospital dictrict/Hyvinkää hospital area, Helsinki University Hospital, and the National Institute of Health and Welfare granted the permission to conduct the study project.

Prior to completing the self-questionnaires (I, II, III, IV, V), adolescents received both written and oral information about the study. Participation was voluntary and they were assured of the confidentiality of the data. No identifying factors were asked, only age and gender was written on the self-questionnaires. Return of the completed questionnaires from the participants was taken as confirmation of their consent. The outpatients who agreed to participate in the study gave their written informed consent. Among them, the name and personal identity number were asked as background variables. A letter was sent to the guardians to inform them about the study, and the guardians had the opportunity to familiarize themselves with the self-assessments. The adolescents were informed that they could contact the researchers if the content of the self-assessments raised questions or ideas that they wanted to share with the researchers.

The study among forensic psychiatric patients (VI) was register-based and they were not contacted.

4.6. Personal involvement

Upon entering the study project, the first community data (I, II, III, IV, V) was already collected by Professor Nina Lindberg and PhD Matti Kaivosoja. I participated in planning the outpatient study (V) and the criminal study (VI). I participated in applying for the permissions to perform these studies. I collected the patient data (V), as well as the later community data (V). Professor Lindberg collected the forensic psychiatric data (VI) from the archives of the the National Institute of Health and Welfare. The Dutch data (IV) were collected by local reseachers: PhD Sanne Hillege and Professor Corinne de Ruiter. Professors Lindberg and Riittakerttu Kaltiala-Heino contacted Professor de Ruiter and proposed collaboration after reading the article about measuring psychopathic traits in Dutch community youth (Hillege et al., 2010). The Dutch researchers kindly sent their data as an electronic file to Finnish researchers. I analyzed all data (I, II, III, IV, V, VI) and performed the statistical analyses under the supervision of Professor Jouko Miettunen (senior researcher). I was the first author on 5 manuscripts (I, II, III, IV, V) and the second author on one manuscript (VI).

5 Results

5.1 Psychometric properties of the YPI and APSD-SR (I)

5.1.1 Internal consistency

First, internal consistency reliability, described with the Cronbach's alpha coefficient, was studied (**Table 5**). Regarding the YPI, good to excellent reliability indices were obtained for both genders for the total score and for the Interpersonal and Behavioral dimension scores. With regard to the Affective dimension, internal consistency reliability was insufficient in boys and acceptable in girls. Focusing on the subdimensions, the reliability indices varied from acceptable to good, with some exceptions; Unemotionality in both genders, as well as Irresponsibility in girls, exhibited only marginal internal consistency reliability and Callousness appeared to be internally inconsistent in both genders. Regarding the APSD-SR, Cronbach's alpha coefficients indicated acceptable internal consistency reliability for both the total score and the Interpersonal dimension score in both genders. Internal consistency reliability for both genders was marginal for the Behavioral dimension and insufficient for the Affective dimension.

5.1.2 Correlations

With regard to the YPI, the inter-dimensional correlations, as well as the correlations between the total score and each of the three dimensional scores were mostly high. Regarding the APSD-SR, the total score correlated highly with both the Interpersonal and Behavioral dimension scores and moderately with the Affective dimension score. All the inter-dimensional correlations involving the Affective dimension remained modest in both genders. Moreover, in boys, the Affective and Behavioral dimensions did not correlate with each other. For correlation coefficients, see the original article I, Table 3, page 6.

Table 5. Internal consistencies of the YPI and APSD-SR, study by study, presented as Cronbach's alpha

	Finnish community boys	Finnish community girls	Finnish outpatient girls	Dutch community boys	Dutch community girls
	α	α	α	α	α
YPI					
YPI Total	0.91	0.89	0.87	0.74	0.76
YPI Dimension					
Interpersonal	0.90	0.87	0.84	0.85	0.83
Affective	0.55	0.73	0.77	0.61	0.61
Behavioral	0.86	0.80	0.75	0.71	0.76
YPI subdimension					
Dishonest charm	0.81	0.82		0.74	0.75
Grandiosity	0.79	0.82		0.81	0.76
Lying	0.82	0.77		0.72	0.78
Manipulation	0.86	0.81		0.81	0.77
Remorselessness	0.83	0.78		0.63	0.63
Unemotionality	0.65	0.65		0.50	0.57
Callousness	0.41	0.44		0.25	0.46
Thrill-seeking	0.80	0.78		0.55	0.72
Impulsiveness	0.73	0.77		0.62	0.71
Irresponsibility	0.74	0.68		0.60	0.59
APSD					
APSD total	0.78	0.79			
APSD-SR Dimension					
Interpersonal	0.78	0.74			
Affective	0.38	0.29			
Behavioral	0.68	0.68			

With regard to the convergent validity of these two self-assessments, in both genders the total scores, as well as the Interpersonal and Behavioral dimension scores, strongly correlated with each other, but the correlation between the Affective dimension scores remained small. For convergent validity, see the original article I, Table 3, page 6.

5.1.3 Factor structure

To explore the factor structure of the self-assessments, the CFA was performed. With regard to both self-assessments, the CFA did not support the three-factor model. This applied to both genders.

On the item level, the three-factor model produced a poor fit for both self-assessments (**Table 6**).

Table 6. Confirmatory Factor Analysis (CFA) fit for the three-factor model of the YPI (50 items) and APSD-SR (20 items)

	χ^2		df		CFI		RMSEA	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
YPI	2461	4924	1172	1225	0.680	0.670	0.080	0.072
APSD-SR	610	512	169	169	0.475	0.546	0.123	0.101

χ^2 = Chi-square test; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = the Root Square Error of Approximation

Thus, the PCA with oblique Promax rotation for the subdimensions of the YPI and the items of the APSD-SR were applied. For the YPI, a two-factor model with eigenvalues greater than one was suggested. In this model, however, all subdimensions except Callousness loaded on the same factor in boys. Forcing the model into three factors resulted in theoretically meaningful subdimension loadings, except that Remorselessness and Unemotionality loaded on the Interpersonal factor instead of the Affective one in boys and on both the Interpersonal and Affective factors in girls. With regard to the APSD-SR, the PCA suggested five- and six-component models, with eigenvalues greater than one. In a model limited to three factors, item loadings resembled the original three-factor structure. However, there turned out to be a number of inconsistent loadings:

1. APSD-SR Item 1 (Blames others for mistakes): loaded on the interpersonal factor in boys, but on the behavioral one in girls

2. APSD-SR Item 3 (Concerned about schoolwork, reverse coded): loaded negatively on the behavioral factor in both genders, although, based on the original work of the developers, loading to the affective factor was expected
3. APSD-SR Item 5 (Shallow emotion): loaded on the behavioral factor in boys, but on the interpersonal one in girls
4. APSD-SR Item 6 (Lies easily and skillfully): loaded to both interpersonal and behavioral factors in both genders
5. APSD-SR Item 15 (Becomes angry when corrected): loaded on both the interpersonal and affective factors in boys, but on the interpersonal factor in girls
6. APSD-SR Item 19 (Does not show emotions): loaded on the interpersonal factor in boys, but on the behavioral one in girls

For more on the PCA and the loading, see the original article I, Table 4, page 7.

5.2 Gender differences in psychopathic traits in the community (I)

With both self-assessments, boys showed significantly higher total scores, as well as both Interpersonal and Affective dimension scores than did girls. On the Behavioral dimension, no statistically significant difference emerged. The effect sizes indicated the most notable gender differences in the affective component (C-U) of the psychopathy syndrome. With regard to the YPI, boys scored significantly higher on Callousness, Unemotionality, Remorselessness, Lying and Irresponsibility (for details, see **Table 7,** page 69).

5.3 Relations between psychopathic traits and emotional and behavioral functioning in community youth (II)

Internal consistencies of the self-assessments are presented in **Table 5** (YPI) and in **Table 8,** page 70 (YSR).

With regard to the YPI and YSR, gender comparisons are presented in **Table 7** (YPI) and in **Table 9,** page 71 (YSR). Overall, boys exhibited significantly higher traits of psychopathy, except on the behavioral dimension where no significant gender difference was observed. Regarding the YSR, girls scored significantly higher on the total scale, Internalizing scale, as well as on all syndrome scales except rule-breaking where the difference did not reach statistical significance. No statistically significant difference was observed on the Externalizing scale.

Table 7. Gender comparisons in the YPI and APSD-SR scores in different sub-samples. In studies I and IV, medians are presented; in study II, means and standard deviations are presented. Comparisons were performed with the Mann-Whitney U-test (U) or the Independent sample t-test (t) after logarithm transformation.

	Study I				**Study II**				**Study IV**							
	Boys	Girls	U	ES	Boys	Girls	t	ES	Boys (F)	Boys (D)	U	ES	Girls (F)	Girls (D)	U	ES
Y: Dishonest charm	1.80	1.60	16083.50	0.104					1.80	2.00	15325.50**	-0.318	1.60	1.60	24243.00	0.000
Y: Grandiosity	1.80	1.40	12092.50**	0.480					1.80	1.75	18074.50	0.041	1.40	1.20	18940.00**	0.437
Y: Lying	1.80	1.50	14955.00*	0.234					1.80	2.00	15343.00**	-0.318	1.40	1.40	24980.50	0.000
Y: Manipulation	1.50	1.40	16690.50	0.091					1.60	1.80	14399.00**	-0.440	1.40	1.40	24491.50	0.083
Y: Remorselessness	1.60	1.40	12999.50**	0.425					1.60	2.00	12963.00**	-0.440	1.33	1.40	19669.50**	-0.308
Y: Unemotionality	2.20	1.80	10740.00**	0.605					2.20	2.20	1741.00	-0.152	1.70	1.60	23036.00	0.158
Y: Callousness	2.20	1.60	6988.00**	1.154					2.20	2.40	13308.50**	-0.440	1.60	1.80	18583.00**	-0.440
Y: Thrill-seeking	2.60	2.60	16349.00	0.088					2.60	2.80	15541.50**	-0.353	2.55	2.40	24538.00	-0.062
Y: Impulsiveness	2.00	2.20	15909.50	-0.119					2.00	2.40	15298.00**	-0.440	2.20	2.20	22805.50	0.183
Y: Irresponsibility	1.80	1.40	13722.00**	0.392					1.80	1.80	18782.00	0.000	1.40	1.40	24746.00	0.074
Y: Interpersonal	7.00	6.40	14645.00*	0.263	1.78(0.58)	1.64(0.53)	-2.50*	0.261	7.00	7.40	15686.50**	-0.294	6.20	5.80	23538.00	0.140
Y: Affective	6.00	4.60	8097.50**	0.900	2.02(0.43)	1.64(0.42)	-9.39**	0.981	6.00	6.80	12756.50**	-0.440	4.60	5.00	20389.00**	-0.246
Y: Behavioral	6.35	6.20	16166.00	0.133	2.17(0.61)	2.10(0.54)	-0.96	0.098	6.35	6.80	15886.50**	-0.285	6.20	6.20	23852.00	-0.078
Y: Total	19.60	17.20	13066.00**	0.426	1.97(0.49)	1.78(0.42)	-4.16**	0.436	19.60	21.25	14360.00**	-0.440	17.10	17.20	24342.00	-0.032
A: Interpersonal	0.29	0.29	11552.50**	0.304												
A: Affective	0.67	0.50	14392.50**	0.578												
A: Behavioral	0.80	0.80	16197.50	0.115												
A: Total	1.77	1.41	12658.00**	0.427												

Y=The YPI, A=The APSD-SR, F=Finnish, D=Dutch, ES=effect size.
** = difference is significant at the 0.01 level (2-tailed); * = difference is significant at the 0.05 level (2-tailed)

Table 8. Internal consistencies of the YSR, study by study, presented as Cronbach's alpha

	Study II		Study III
Youth Self Report (YSR)	Boys	Girls	Whole sample
Syndrome scale			
Anxious/Depressed	0.87	0.84	0.87
Withdrawn/Depressed	0.76	0.72	0.74
Somatic complaints	0.86	0.74	0.82
Social problems	0.79	0.67	0.74
Thought problems	0.82	0.70	0.74
Attention problems	0.70	0.67	0.69
Rule-breaking behavior	0.87	0.84	0.87
Aggressive behavior	0.88	0.83	0.85
Internalizing scale	0.86	0.79	0.83
Externalizing scale	0.88	0.83	0.84
Total problems	0.90	0.83	0.90

Correlations between the YPI and YSR are presented in **Tables 10a and 10b** (pages 74-75). In both genders, psychopathic traits correlated highly with aggressive and rule-breaking behavior, moderately with thought and attention complaints, and modestly with anxiety, depression, withdrawal and social problems. Correlations between psychopathic traits and somatic problems were moderate in boys, but modest in girls.

Fisher's z transformation revealed only a few statistically significant gender differences; the correlation between the Interpersonal dimension of the YPI and somatic complaints ($z = 1.99$, $p = 0.046$) and the correlation between the Affective dimension of the YPI and rule-breaking behavior ($z = 2.38$, $p = 0.017$) were significantly stronger in boys than in girls.

5.4 Self-assessed limited prosocial emotions in community youth (III)

Among the adolescents, 35/366 (9.6%) met the criteria for LPE. It was significantly more prevalent in boys than girls (boys: 25/170 vs. girls: 10/196, $\chi^2 = 971$, $p < 0.001$, $\varphi = 0.16$).

Table 9. Comparisons concerning general psychopathology in different sub-samples

	Study II				Study III			
Youth Self Report (YSR)	Girls	Boys	t	ES	Adolescents with LPE	Adolescents without LPE	U	ES
Total	52.4 (23.80)	42.0 (29.43)	-4.16**	-0.535	39.00	44.00	5156.5	0.446
Internalizing scale	17.6 (9.37)	10.8 (9.88)	-2.50**	-0.817	9.00	13.00	4754.5	0.410
Externalizing scale	13.0 (8.50)	13.0 (10.34)	-9.39	0.116	10.00	11.00	5099.5	0.440
Dimensions								
Anxious/Depressed	7.3 (0.53)	3.7 (4.22)	8.66**	-0.894	3.00	5.00	4721.0	0.408
Withdrawn/Depressed	4.3 (2.87)	3.4 (2.91)	3.59**	-0.375	3.00	3.00	5736.5	0.495
Somatic complaints	5.9 (3.45)	3.9 (3.45)	7.36**	-0.762	2.00	4.00	4271.0*	0.369
Social problems	3.9 (2.83)	3.3 (3.33)	3.24**	-0.329	4.00	3.00	5139.0	0.444
Thought problems	599 (4.29)	4.6 (4.09)	3.68**	-0.390	4.00	4.00	5558.5	0.480
Attention problems	6.1 (2.84)	5.2 (2.98)	3.55**	-0.373	5.00	6.00	5419.5	0.468
Rule-breaking behavior	5.2 (4.48)	6.3 (5.38)	-2.10	0.216	4.00	4.00	5187.0	0.448
Aggressive behavior	7.8 (4.73)	6.7 (5.58)	3.35**	-0.345	5.00	6.00	4993.0	0.431

Comparisons were performed with the Mann-Whitney U-test (U) or the Independent sample t-test (t) post-hoc with the Benjamini-Hochberg Procedure after logarithm transformation. ES = effect size; ** = difference is significant at the 0.01 level (2-tailed); * = difference is significant at the 0.05 level (2-tailed).

Table 10a. Pearson's correlations between the YPI dimensional/total scores and the YSR syndrome/ broadband/total problems scale scores in boys

Strong	YPI Behavioral	YSR Externalizing scale	r = 0.674**
	YPI Total	YSR Externalizing scale	r = 0.670**
	YPI Behavioral -	YSR Rule-breaking behavior	r = 0.661**
	YPI Total -	YSR Rule-breaking behavior	r = 0.648**
	YPI Total	YSR Aggressive behavior	r = 0.577**
	YPI Interpersonal	YSR Externalizing scale	r = 0.572**
	YPI Total	YSR Total problems scale	r = 0.558**
	YPI Interpersonal	YSR Aggressive behavior	r = 0.554**
	YPI Behavioral	YSR Total problems scale	r = 0.546**
	YPI Behavioral	YSR Aggressive behavior	r = 0.544)**
	YPI Interpersonal	YSR Total symptom scale	r = 0.519**
	YPI Affective	YSR Rule-breaking behavior	r = 0.518**
	YPI Interpersonal	YSR Rule-breaking behavior	r = 0.517**
Moderate	YPI Affective	YSR Externalizing scale	r = 0.496**
	YPI Behavioral	YSR Attention problems	r = 0.484**
	YPI Total	YSR Attention problems	r= 0.443**
	YPI Total	YSR Thought problems	r = 0.443**
	YPI Behavioral	YSR Thought problems	r = 0.442**
	YPI Interpersonal	YSR Thought problems	r = 0.410**
	YPI Affective	YSR Aggressive behavior	r = 0.392**
	YPI Interpersonal	YSR Somatic complaints	r = 0.392**
	YPI Total	YSR Somatic complaints	r = 0.380**
	YPI Interpersonal	YSR Internalizing scale	r = 0.376**
	YPI Interpersonal	YSR Attention problems	r = 0.363**
	YPI Affective	YSR Total problems scale	r = 0.357**
	YPI Total	YSR Internalizing scale	r = 0.334**
	YPI Behavioral	YSR Somatic complaints	r = 0.323**
	YPI Interpersonal	YSR Social problems	r = 0.318**
Modest	YPI Interpersonal	YSR Anxious/depressed	r = 0.286**
	YPI Total	YSR Social problems	r = 0.282**
	YPI Affective	YSR Attention problems	r = 0.271**
	YPI Affective	YSR Thought problems	r = 0.267**
	YPI Behavioral	YSR Internalizing scale	r = 0.260**
	YPI Interpersonal	YSR Withdrawn/depressed	r = 0.255**
	YPI Total	YSR Anxious/depressed	r = 0.243**
	YPI Affective	YSR Somatic complaints	r = 0.242)**
	YPI Total	YSR Withdrawn/depressed	r = 0.224**
	YPI Behavioral	YSR Social problems	r = 0.204**
	YPI Affective	YSR Internalizing scale	r = 0.193*
	YPI Affective -	YSR Social problems	r = 0.193*
	YPI Affective	YSR Withdrawn/depressed	r = 0.190*
	YPI Behavioral	YSR Anxious/depressed	r = 0.177*
Insignificant	YPI Affective	YSR Anxious/depressed	r = 0.124
	YPI Behavioral	YSR Withdrawn/depressed	r = 0.102

Analyses were performed using logarithm-transformed values and age was controlled for.
** = correlation is significant at the 0.00750 level; * = correlation is significant at the 0.04432 level (= the Benjamini-Hochberg critical values).

Table 10b. Pearson's correlations between the YPI dimensional/total scores and the YSR syndrome/ broadband/total problems scale scores in girls

Strong	YPI Behavioral	YSR Externalizing scale	r = 0.678**
	YPI Behavioral	YSR Rule-breaking behavior	r = 0.625**
	YPI Total	YSR Externalizing scale	r = 0.602**
	YPI Behavioral	YSR Aggressive behavior	r = 0.579**
	YPI Total	YSR Rule-breaking behavior	r = 0.540**
	YPI Total	YSR Aggressive behavior	r = 0.525**
	YPI Behavioral	YSR Attention problems	r = 0.523**
	YPI Behavioral	YSR Total problems scale	r = 0.517**
Moderate	YPI Total	YSR Total problems scale	r = 0.475**
	YPI Interpersonal	YSR Externalizing scale	r = 0.442**
	YPI Interpersonal	YSR Aggressive behavior	r = 0.400**
	YPI Total	YSR Thought problems	r = 0.390**
	YPI Behavioral	YSR Thought problems	r = 0.389**
	YPI Interpersonal	YSR Rule-breaking behavior	r = 0.378**
	YPI Total	YSR Attention problems	r = 0.369**
	YPI Interpersonal	YSR Total problems scale	r = 0.366**
	YPI Affective	YSR Externalizing scale	r = 0.345**
	YPI Behavioral	YSR Somatic complaints	r = 0.337**
	YPI Interpersonal	YSR Thought problems	r = 0.332**
	YPI Affective	YSR Rule-breaking behavior	r = 0.311**
Modest	YPI Affective	YSR Aggressive behavior	r = 0.299**
	YPI Behavioral	YSR Internalizing scale	r = 0.297**
	YPI Total	YSR Somatic complaints	r = 0.269**
	YPI Affective	YSR Withdrawn/depressed	r = 0.268**
	YPI Affective	YSR Total problems score	r = 0.264**
	YPI Total	YSR Internalizing scale	r = 0.256**
	YPI Total	YSR Withdrawn/depressed	r = 0.244**
	YPI Behavioral	YSR Anxious/depressed	r = 0.237**
	YPI Affective	YSR Thought problems	r = 0.204**
	YPI Interpersonal	YSR Internalizing scaler	r = 0.202**
	YPI Interpersonal	YSR Somatic complaints	r = 0.200**
	YPI Interpersonal	YSR Attention problems	r = 0.197**
	YPI Interpersonal	YSR Withdrawn/depressed	r = 0.194)**
	YPI Total	YSR Anxious/depressed	r = 0.188*
	YPI Behavioral	YSR Withdrawn/depressed	r = 0.173*
	YPI Total	YSR Social problems	r = 0.170*
	YPI Affective	YSR Internalizing scale	r = 0.170*
	YPI Interpersonal	YSR Anxious/depressed	r = 0.170*
	YPI Interpersonal	YSR Social problems	r = 0.157*
Insignificant	YPI Affective	YSR Social problems	r = 0.140
	YPI Behavioral	YSR Social problems	r = 0.120
	YPI Behavioral	YSR Withdrawn/depressed	r = 0.102
	YPI Affective	YSR Somatic complaints	r = 0.100
	YPI Affective	YSR Anxious/depressed	r = 0.014

Analyses were performed using logarithm-transformed values and age was controlled for.
** = correlation is significant at the 0.00750 level; * = correlation is significant at the 0.04432 level (= the Benjamini-Hochberg critical values).

On the other hand, the prevalence of adolescents without any of the four LPE-specifier criteria was significantly higher in girls than boys (boys: 66/170 vs. 105/196, $\chi^2 = 7.95$, p = 0.004, φ = 0.15). "Unconcerned about performance" was the most common single criterion in both genders (boys: 35.3%, girls: 31.6%) followed by "shallow affect" (boys: 17.6%, girls: 14.8%), "lack of remorse" (boys: 19.4%, girls: 4.6%), and "lack of empathy" (boys: 8.2%, girls: 3.6%). The criterion "lack of remorse" was significantly more prevalent in boys than girls (boys: 33/170 vs. girls: 9/196, $\chi^2 = 19.68$, $p < 0.001$, φ = 0.23).

When juveniles with LPE were compared to their classmates without LPE, the groups highly resembled each other; adolescents with LPE scored significantly lower on somatic complaints, but other comparisons did not reach statistical significance (**Table 9**).

Finally, since "unconcerned about performance" turned out to be a common feature among the juveniles (boys: 35.3%, girls: 31.6%), the data was also analyzed without this criterion. In this theoretical model, prevalence of LPE decreased from 9.6% to 5.2%. No statistically significant differences were observed between the LPE+ and LPE- groups in general psychopathology.

All comparisons can be seen in the original article (see the original article III, Tables I and II on page 3).

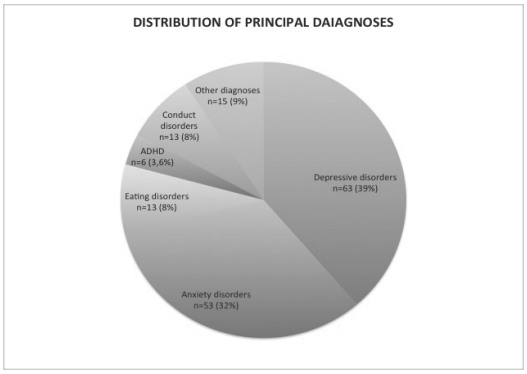
5.5 Differences in psychopathic traits between Finnish and Dutch community youth (IV)

Finnish boys scored significantly lower than Dutch boys on the YPI total and dimensional scores (**Table 7**). With regard to the subdimensional level, Finnish boys scored significantly lower on all subdimensions except grandiosity, unemotionality and irresponsibility, where no statistically significant differences were observed. The Finnish girls scored significantly lower on the Affective dimension score, as well as on the subdimensions Remorselessness and Callousness. The Dutch girls, on the other hand, scored significantly lower on Grandiosity (**Table 7)**.

5.6 Psychopathic traits in female adolescent psychiatric outpatients (V)

The distribution of psychiatric disorders among 163 female outpatients can be seen in **Figure 2.**

Figure 2. The distribution of the ICD-10 based
principal psychiatric diagnoses among female psychiatric outpatients.



Depressive disorders: F32-F33; Anxiety disorders: F40-43; Eating disorders: F50;
ADHD: F90; Conduct disorders: F91-F92; Other diagnoses: F20-29 (n=5),
F31 (n=4), F43-48 (n=1), F60-69 (n=1), F80-89 (n=3), F99 (n=1).

Depressive, anxiety and eating disorders were pooled together to form a group of internalizing disorders; conduct diorders and ADHD were pooled together to form a group of externalizing disorders.

With regard to the psychopathy total score, girls with externalizing disorders (EXT) scored significantly higher than girls with internalizing disorders (INT) (EXT: mean 2.30, SD 0.30 vs. INT: mean 1.80, SD 0.38, $q = -4.954$, $p < 0.001$) and girls in the community (COM) (EXT: mean 2.30, SD 0.39 vs. COM: mean 1.77, SD 0.39, $q = 5.594$, $p < 0.001$). No statistically significant difference was observed between girls with internalizing disorders and girls in the community (INT: mean 1.80, SD 0.38 vs COM 1.77, SD 0.39, $q = 0.970$, $p = 0.60$). On the Interpersonal dimension, girls with externalizing disorders scored significantly higher than girls with internalizing disorders (EXT: mean 1.91, SD 0.53 vs. INT: mean 1.56, SD 0.48, $q = -2.997$, $p = 0.01$) and community girls (EXT: mean 1.91, SD 0.53 vs. COM: mean 1.62, SD 0.48, $q = 2.484$, $p = 0.04$). Girls with internalizing disorders did not significantly differ from community girls (INT: mean 1.56, SD 0.48 vs. COM 1.62, SD 0.48, $q = -1.475$, $p = 0.31$). The same pattern was seen on the Affective dimension (EXT: mean 2.09, SD 0.54 vs. INT: mean 1.62, SD 0.41, $q = -4.373$, $p < 0.001$; EXT: mean 2.09, SD 0.54 vs. COM: 1.63, SD 0.42, $q = 4.413$, $p < 0.001$; INT vs. COM, $q = -0.346$, $p = 0.94$). With regard to the Behavioral dimension, girls with externalizing disorders scored significantly higher than girls with internalizing disorders (EXT: mean 3.04, SD 0.52 vs. INT: mean 2.32, SD 0.52, q = -

4.812, $p < 0.001$) and girls in the community (EXT: mean 3.04, SD 0.52 vs. COM: mean 2.10, SD 0.51, $q = 6.809$, $p < 0.001$). Girls with internalizing disorders scored significantly higher on the Behavioral dimension than community girls (INT: mean 2.32, SD 0.52 vs. COM: 2.10, SD 0.51, $q = 4.096$, $p < 0.001$).

5.7 Relations between psychopathic traits and psychiatric disorders in female psychiatric outpatients (V)

The results from the logistic regression analysis can be seen in **Table 11**. With regard to the total psychopathy scores, the odd ratios (OR) indicated a significant risk for any psychiatric disorder, a depressive disorder, ADHD, CD, as well as for an externalizing disorder as a consequence of a one-point increase on the Likert-type scale. With regard to the Interpersonal dimension, a significant risk was found for an externalizing disorder, and, with regard to the Affective dimension, a corresponding risk for ADHD, a conduct disorder, and an externalizing disorder. Finally, with regard to the Behavioral dimension, the ORs indicated a significant risk for any psychiatric disorder, a depressive disorder, ADHD, CD an internalizing disorder, and an externalizing disorder.

5.8 Psychopathic traits in girls charged with serious violent offenses

Of the 25 girls, 8 (32.0%) showed substantial psychopathic traits (PCL-YV $\geq$ 25), but no statistically significant difference to age-matched boy offenders was observed in prevalence (girls: 8/25 vs. boys: 7/25, $\chi^2 = 0.095$, $p = 0.758$, $\varphi = -0.044$). With regard to the PCLV-YV total scores, no statistically significant gender difference emerged (girls: mean 19.76, SD 8.52 vs. boys: mean 20.32, SD 6.50, $t = -0.261$, $p = 0.795$, $d = -0.073$).

Table 11. Associations between the YPI scores and the ICD-10 based psychiatric disorders in logistic regression analysis. Odds ratios (ORs) with 95% confidence intervals (CI)* are reported.

Statistically significant			Below statistical significance		
Association		OR (95% CI)	Association		OR (95% CI)
YPI Behavioral	ADHD	18.26 (3.45-96.51)	YPI Interpersonal	ADHD	3.86 (0.83-17.87)
YPI Total	ADHD	12.91 (2.15-77.52)	YPI Interpersonal	CD	2.42 (0.89-6.57)
YPI Behavioral	EXT	12.25 (5.09-34.48)	YPI Affective	Depressive disorder	1.52 (0.87-2.64)
YPI Behavioral	CD	11.19 (3.82-32.79)	YPI Behavioral	Anxiety disorder	1.50 (0.90-2.51)
YPI Total	EXT	6.84 (2.70-17.34)	YPI Interpersonal	Depressive disorder	1.38 (0.77-2.49)
YPI Affective	ADHD	6.44 (2.04-20.32)	YPI Affective	A psychiatric disorder	1.25 (0.83-1.87)
YPI Total	CD	5.29 (1.85-15.12)	YPI Total	INT	1.14 (0.72-1.81)
YPI Affective	EXT	4.15 (1.99-8.65)	YPI Interpersonal	A psychiatric disorder	1.10 (0.72-1.67)
YPI Behavioral	Depressive disorder	3.36 (1.98-5.69)	YPI Behavioral	Eating disorder	1.01 (0.38-2.73)
YPI Affective	CD	3.26 (1.30-8.20)	YPI Interpersonal	INT	0.98 (0.60-1.58)
YPI Behavioral	A psychiatric disorder	2.80 (1.97-3.98)	YPI Affective	INT	0.93 (0.57-1.51
YPI Interpersonal	EXT	2.72 (1.16-6.37)	YPI Interpersonal	Anxiety disorder	0.69 (0.32-1.50)
YPI Behavioral	INT	2.11 (1.45-3.08)	YPI Total	Anxiety disorder	0.58 (0.26-1.28)
YPI Total	Depressive disorder	2.01 (1.16-3.48)	YPI Affective	Anxiety disorder	0.52 (0.22-1.22)
YPI Total -	A psychiatric disorder	1.57 (1.05-2.34)	YPI Interpersonal	Eating disorder	0.35 (0.05-2.69)
			YPI Total	Eating disorder	0.28 (0.04-2.21)
			YPI Affective	Eating disorder	**

*A risk to have a psychiatric disorder as a consequence of a one point increase on the Likert-type scale.
**The analysis was not applicable due to lack of cases in the upper (2 and 3) Likert-scale categories on the Affective dimension of the YPI.
The logistic regression analysis was performed with age-adjusted values.
INT = Internalizing disorder; EXT = Externalizing disorder; CD = Conduct disorder

However, focusing on underlying factors, girls scored significantly lower on the Antisocial factor than did boys (girls: mean 5.52, SD 2.62 vs. boys: mean 6.88, SD 1.74, t = -2.164, p = 0.035, d = 0.624). On the item level, girls scored lower on stimulation-seeking (girls: mean 1.44, SD 0.71 vs. boys: mean 1.92, SD 0.28, t = -3.142, p = 0.003, d = 0.907), poor anger control (girls: mean 1.36, SD 0.70 vs. boys: mean 1.84, SD 0.37, t = -3.024, p = 0.004, d = 0.873), early problem behavior (girls: mean 1.20, SD 0.91 vs. boys: mean 1.68, SD 0.56, t = -2.245, p = 0.039, d = 0.648), impulsivity (girls: mean 1.56, SD 0.71 vs. boys: mean 1.92, SD 0.28, t = -2.357, p = 0.023, d = 0.680), irresponsibility (girls: mean 1.28, SD 0.69 vs. boys: mean 1.64, SD 0.57, t = -2.034, p = 0.048, d = 0.587), and criminal versatility (girls: mean 1.00, SD 0.82 vs. 1.48, SD 0.71, t = -2.213, p = 0.032, d = 0.639). On the other hand, girls scored significantly higher on the item Unstable interpersonal relationships (girls: mean 1.00, SD 0.96 vs. boys: 0.28, SD 0.61, t = 3.116, p = 0.003, d = 0.914). Girls showed a tendency to score higher on the item Impersonal sexual behavior, but this difference did not reach statistical significance (girls: mean 0.80, SD 0.96 vs. boys: 0.36, SD 0.64, t = 1.912, p = 0.062, d = 0.552).

With regard to background variables, girls had been sexually abused as children significantly more often than boys (girls: 9/25 vs. boys: 0/25, p = 0.001, Fisher`s exact test). With regard to offender- and offense-related variables, girls were intoxicated during the index offense significantly less often (girls: 15/25 vs. boys: 22/25, χ^2 = 5.094, t = 0.024, φ = 0.319) and their victims were family members or current or ex-intimates significantly more often (girls: 9/24 vs. boys: 0/24, p = 0.001, Fisher`s exact test). The victims of boys were strangers significantly more often (girls: 4/24 vs. boys: 19/24, p < 0.001, Fisher`s exact test).

Other comparisons, which did not reach statistical significance, can be seen in the original article (article VI, Table I, pages 5-6).

6 Discussion

6.1 Psychometric properties of the YPI and APSD-SR (I)

6.1.1 Internal consistency

The internal consistencies of the YPI varied from good to excellent for the total score, as well as for the underlying Interpersonal and Behavioral dimension scores in both genders. With regard to the Affective dimension, Cronbach's alphas indicated acceptable internal consistency in girls but insufficient in boys. The weakness in assessing the affective component of psychopathy syndrome was mainly due to the subdimension Callousness, where the α-coefficients were the lowest (0.41 in boys and 0.45 in girls). This finding is in line with previous research performed both among non-referred and delinquent populations (Andershed et al., 2007; Hillege et al., 2010; Poythress et al., 2006; Skeem and Cauffman, 2003).

With regard to the APSD-SR, the total score, as well as the Interpersonal dimension score, demonstrated acceptable internal consistencies. The internal consistency was marginal for the Behavioral dimension, but insufficient for the Affective dimension (0.38 in boys and 0.29 in girls). A similar finding was recently found by Pechorro et al. (2013) among mid-adolescent Portuguese community youth; their internal consistency coefficient for the APSD-SR total score was acceptable, marginal for the Interpersonal dimension and inconsistent for both the Affective and Behavioral dimensions. Moreover, a previous Finnish community study by Laajasalo et al. (2014) reported internal consistency indices very much like those observed in the present study, except that they managed to obtain better (marginal) Cronbach's α coefficient for the Affective dimension.

Overall, the internal consistency coefficients for the YPI turned out to be better than those obtained for the APSD-SR. This is very much in line with the findings of two previous comparison studies that both were performed in delinquent samples (Colins et al., 2014; Poythress et al., 2006).

6.1.2 Correlations

With regard to correlations, all YPI dimensions correlated with each other at least moderately. The inter-dimensional correlations of the APSD-SR, which included the Affective dimension, were only modest or worse in both genders. This finding mirrors that of Laajasalo et al. (2014). The correlation between the Affective dimensions of both instruments turned out to be weak.

Thus, it seems that, though neither of these two self-assessments is good at capturing the affective (C-U) traits of psychopathy syndrome, the YPI performs better than the APSD-SR. There are several reasons for this. First, the YPI was originally developed as a self-report. The APSD, on the contrary, was initially designed for parents and teachers to fill in. Second, the developers of the YPI took into account the obvous limitations of the APSD, including the low number of items for a trait and too direct and transparent style of the statements (Andershed et al., 2002; Colins et al., 2014; Poythress et al., 2006). The weak correlations between the Affective dimension and the two other dimensions of the APSD-SR, which correlate strongly with each other, have raised a question regarding whether the APSD-SR actually more sensitively captures antisocial behavior than other core elements of the psychopathy syndrome (Colins et. al., 2014). In the YPI, the Interpersonal and Affective dimensions were strongly correlated with each other. The need to further develop the APSD-SR triggered Frick (Kimonis et al., 2008) to design the ICU-SR. The main focus of the ICU-SR is on the affective component of the psychopathy syndrome. The developers of the YPI have also started to consider a revised version of the instrument. The revised instrument should tap the affective (C-U) traits better than the original (Andershed et al., 2007).

6.1.3 Factor structure

The factor structure of adult psychopathy has been well studied. Originally, 20 items of the PCL were organized into two factors: one measuring interpersonal and emotional deficits, the other measuring social deviance (Hare, 1991). Subsequently, Cooke and Michie (2001) utilized only 13 of 20 original items and reported a three-factor model: Factor 1 reporting arrogant and deceitful interpersonal style, Factor 2 reporting deficient affective experience, and Factor 3 reporting impulsive and irresponsible behavior. Moreover, in the revised PCL-R manual (Hare, 2003), a four-factor model is described;

Hare incorporated the three Cooke and Michie (2001) factors, which he called Interpersonal, Affective, and Lifestyle, and described a fourth factor, which he named Antisocial (made up of five of the items put aside by Cooke and Michie). Most recently, an alternative structural model for psychopathy has been proposed: a bifactor model, in which the general factor does not relate to the dimensions but accounts for the overlap between all items and items with similar content are additionally related to separate group factors (Patrick et al., 2007).

All instruments developed to measure psychopathic traits in under-aged populations, including the self-assessments of the present study, are derived from the PCL instrument. From this perspective, it can be assumed that their factor structures resemble that of the PCL-R. With regard to the YPI, the original three-factor model (Interpersonal, Affective, Behavioral) has repeatedly shown acceptable fit (Colins et al., 2014; Declercq et al., 2009; Hillege et al., 2010; Larsson et al., 2006; Nijhof et al., 2011; Pechorro et al., 2016). With regard to the APSD, however, the findings regarding the best fitting factor structure have been much more inconsistent. The developers of the APSD first identified a two-factor model, in which the first factor was labeled as an Impulsivity/Conduct Problems (I/CP) factor and the second one as a C-U factor. In a later study by Frick, Bodin and Barry (2000), both the two-factor and the three-factor model fitted the data equally well. Later, the two-factor model was supported by Fite et al. (2009), but the three-factor structure (the I/CP factor was divided into two factors, namely Narcissism and Impulsivity gained substantially more support (Dadds et al., 2005; Dong et al., 2014; Laajasalo et al., 2014; Vitacco et al., 2003)

So, from this perspective, it was a bit surprising that, in the present study, the CFA fit indices remained low for the three-factor model. The finding was the same regardless of the instrument or gender, even though the YPI showed a slightly better fit. Also, with regard to the PCA, the three-factor structure did not show the best possible fit. In fact, the analysis suggested a two-factor model for the YPI, but this was not interpretable, especially in boys, where all the sub-dimensions except Callousness loaded onto one factor. When the somewhat statistically weaker three-factor model was used, the original loadings of the subdimensions were obtained with only some exceptions. With regard to the APSD-SR, the PCA suggested multiple factor models. After reducing the factor number to three, item loadings resembling those reported in previous studies (Laajasalo

et al., 2014; Vitacco et al., 2003) were obtained. Still, however, some items loaded inconsistently.

More research in obviously needed in order to shed more light on the factor structure of the instruments aimed to measure juvenile psychopathic traits. Interestingly, the bifactor model was recently studied in relation to the YPI (Pihet et al., 2014; Zwaanswijk et al., 2016). It seems that the bifactor model fits the YPI properly and may be used to compare different groups (e.g., boys vs. girls). Furthermore, psychopathy, as measured with the YPI, within a general population seems to be primarily a unidimensional construct indicating that when interpreting scores the focus should be on the total score, rather than on the dimensional scores (Zwaanswijk et al., 2016).

Summing up, regarding the psychometric properties of the YPI and APSD-SR, this study confirmed that, despite some limitations, self-reports can be used as reliable tools for revealing young persons with elevated traits for psychopathy in large samples, and that the YPI would perform slightly better than the APSD-SR in this purpose.

6.2 Gender differences in psychopathic traits in the community (I)

In adults, research has persistently reported higher rates of psychopathy in community men than in community women, as well as differences in the manifestation of psychopathy across gender, particularly in the expression of interpersonal and behavioral features (Logan and Weizmann-Henelius, 2012). Psychopathic women are described as less grandiose, less superficially charmful and less physically aggressive than psychopathic men; they use more relational and verbal aggression, as well as sexual seduction, to manipulate, dominate, and exploit others (Cale and Lilienfeld, 2002; Forouzan and Cooke, 2005; Logan, 2009; Logan and Weizmann-Henelius, 2012; Nicholls et al., 2009; Nicholls and Petrila, 2005; Wynn et al., 2012).

In a study by Kreis and Cooke (2011), the Comprehensive Assessment of Psychopathic Personality (CAPP) (Cooke et al., 2012) was completed by 132 international mental health profesionals, mainly psychiatrists and psychologists working in the field of forensic psychiatry. The Prototypical Analysis revealed that psychopathic men and women have similarities, but also highlighted some important gender differences. The principle deficits of psychopathic women were concentrated in the

domains of attachment, dominance, emotion, and self. Among men, deficits were spread more evenly across all six domains (the above-mentioned ones, plus behavior and cognition) and the behavioral domain was substantially more prominent than among women. According to Kreis and Cooke (2011), the prototypical psychopathic woman appears as a person with more unstable self-concept and is more manipulative and emotionally unstable than the prototypical psychopathic man. In contrast, the prototypical psychopathic man is more self-aggrandizing, domineering, aggressive, reckless, unemphatic, invulnerable, and anxiety-free.

In child and adolescent community populations, findings related to gender differences in psychopathy total scores have resembled observed in adult samples (Dadds et al., 2005, Declerq et al., 2009; Essau et al., 2006; Frick et al., 2000; Hillege et al., 2010; Marsee et al., 2005; Pihet et al., 2014); this was also the case in the present study, reporting higher total scores in boys than girls. This often reported gender difference has remained regardless of the study method; in some studies, self-assessements were used and in some studies psychopathic traits were assessed by either parents or teachers.

On the dimensional level, however, the findings have been much more inconsistent. In this community sample, the dimensional and subdimensional manifestations of psychopathic traits did not completely resemble those typical for adults. Like adult men, mid-adolescent boys scored significantly higher on the Affective dimension, as well as the sub-dimensions Grandiosity, Remorselessness, Unemotionality, and Callousness. In fact, according to the effect sizes, gender differences were most prominent for Callousness and Unemotionality. Rather unexpectedly, however, boys scored substantially higher than girls on the Interpersonal dimension of the psychopathy syndrome, and the subdimension Manipulation turned out not to be a girl-dominated feature. In fact, among adults, it has been suggested that it might not be the prevalence but the expression of manipulativeness which differs across gender: manipulative women tend to flirt, while manipulative men typically commit fraud or run scams (Forouzan and Cooke, 2005).

Also, and again somewhat unexpectedly, no statistically significant difference emerged on the Behavioral dimension, including the sub-dimensions Trill-seeking and Impulsiveness. Contrary to the present study, Declerq et al. (2009) reported that Belgian community boys scored significantly higher than girls on all three dimensions of the YPI,

as well as on all sub-dimensions except Impulsivity. Some studies (Frick et al., 1994; Marsee et al., 2005) have reported substantially higher scores in boys than girls on informant-assessed Impulsivity, but they were not able to find any significant gender differences on C-U traits. Again, Houghton et al. (2013), found no substantial gender differences on self-reported C-U traits, though they reported boys scoring higher on Impulsivity and Self-Centeredness.

Summing up, it is difficult to make any final statements on gender effects on the psychopathic traits in youth, since studies often differ in various methodological aspects, including the sample size, developmental stage of the participants, as well as the chosen study method. However, gender differences in psychopathic traits obviously already exist in childhood and adolescence, and community boys tend to score higher than girls on psychopathy total scores.

In future, population-based studies with long follow-up times are needed to better understand the development of gender differences related to psychopathy syndrome.

6.3 The relation between psychopathic traits and general psychopathology in community youth (II)

It has traditionally been reported that adolescent girls exhibit more symptoms of depression, anxiety, and stress than their male counterparts (Liu et al., 2001; West and Sweeting, 2003; Tick et al., 2008; Botticello, 2009), and that externalizing problems are more prevalent in boys and internalizing ones in girls (Liu et al., 2001; Verhulst et al., 1985; Crijnen et al., 1999; Wang et al., 1989; Yang et al., 2008; Duinhof et al., 2015). The findings of the present study were much in agreement with these previous studies when it comes to internalizing symptoms, but no significant gender difference on the Externalizing scale was observed. Girls even reported substantially more aggressive behavior than boys did. The same finding has been found in some previous Finnish community studies (Helstelä and Sourander, 2001; Kapi et al., 2007). Moreover, in a Nordic study including more than 8000 adolescents, girls reported significantly more anger symptoms than boys did (Asgeirsdottir and Sigfusdottir, 2015). It has been suggested that this phenomenon might reflect the social, educational and economic gender equality typical of Nordic countries (Kapi et al., 2007).

The psychopathy total score correlated significantly and positively with all dimensions and scales of the YSR, both in boys and girls. Psychopathic traits and externalizing problems, as well as psychopathic traits and attention problems, showed the strongest correlations. The most probable reason for this finding is that the same biological and environmental factors have been shown to play a role in the etiology of CD and psychopathy (Sevecke and Kosson, 2010). The relation between ADHD and elevated traits of psychopathy is mediated mostly by CD (Sevecke and Kosson, 2010), although ADHD seems to have a small independent contribution as well (Abramowitz et al., 2004). The psychopathy total score failed to correlate with externalizing problems significantly stronger in boys than in girls. Equally, psychopathic traits correlated positively with internalizing problems, but the correlations among girls were not significantly stronger than those among boys. To summarize, even though the Finnish school boys showed higher traits of psychopathy and girls exhibited more general psychopathology, the correlations between psychopathic traits and other forms of psychopathology closely resembled each other.

6.4 Self-assessed limited prosocial emotions in community youth (III)

In this Finnish community sample, approximately one in ten adolescents met the criteria for the LPE specifier. With regard to gender, the phenomenon turned out to be substantially more prevalent among boys than girls. In a U.S. community study (Kahn et al., 2012), 10-32% of those suffering from CD and 2-7% of those not suffering from CD met the specifier threshold, depending on the informant. In another U.S. community study among children from low-income families (Hyde et al., 2015), the prevalence of LPE turned out to be almost 40%. A Belgian study among detained delinquents reported a prevalence rate of 22.5% (Colins and Andershed, 2015). To summarize, one can state that LPE is a rather common phenomenon among adolescents.

Like previously reported among delinquents (Colins and Andershed, 2015), “unconcerned about performance” was the most frequent single criterion. Clinical researchers have already stated some worries about the relevance of this item in the definition of LPE, since lack of concern about one’s performance is such a typical trait for this developmental phase (Jambroes et al., 2016). It was interesting to note that the

prevalence of juveniles with LPE diminished from 9.7% to 5.2% when "unconcerned about performance" item was excluded from the diagnostic criteria.

The C-U traits have been reported to serve as a useful indicator for psychosocial maladjustment among community youth (Viding and McGrory, 2012b). However, in this study, the groups with and without LPE did not substantially differ from each other. The only difference, which reached statistical significance, was that adolescents with LPE scored lower on somatic complaints than those without LPE. Recently, Jambroes et al. (2016) stated that this new specifier might have some potential to be relevant for clinical practice, but its clinical value is not yet convincing. Moreover, incorporating this specifier into a diagnosis of CD among male delinquents, turned out to be of limited usefulness to discriminate between boys with varying levels of psychosocial problems (Colins, 2016).

6.5 Cross-national differences in juvenile psychopathic traits (IV)

The present study was the first one to compare self-assessed psychopathic traits between community youth from two European countries. Dutch boys showed substantially stronger psychopathic traits, as well as underlying dimensional traits, than Finnish boys. With regard to girls, Dutch girls showed substantially higher affective traits than Finnish girls. The finding is in line with a worldwide community study by Neumann et al. (2012), which showed that adult males and females from Western Europe produced the highest scores and males and females from Northern Europe the lowest scores on the affective component of psychopathy. The findings of the present study imply that culture influences the manifestation of psychopathic traits already in adolescence. More research is obviously needed, but some caution is required before generalizing the national research findings.

6.6 Psychopathic traits in adolescent female psychiatric outpatients (V)

Girls with an externalizing disorder showed substantially higher traits of psychopathy than did girls suffering from an internalizing disorder. Girls with externalizing psychopathology exhibited substantially higher levels of psychopathic traits than did girls in the community, but when girls with an internalizing disorder were compared to girls in the community, no significant difference emerged. With regard to underlying

dimensions, girls with an externalizing disorder exhibited substantially more deficient affective experience than did other girls. Both patient groups showed substantially more impulsive and irresponsible lifestyle traits than did girls in the community. More and more, the affective deficit is being regarded as the "core" of the psychopathy syndrome, and the role of impulsivity as a part of the syndrome has been re-evaluated (Poythress and Hall, 2011). Moreover, there are researchers who regard the whole behavioral component more as a consequence of the psychopathy syndrome (Cooke et al., 2004; Skeem and Cooke, 2010). In any case, it is worth noting that a substantial trait difference on the behavioral component of the psychopathy syndrome was observed between female patients with internalizing psychopathology and girls in the community, even though these groups did not substantially differ from each other on either the total psychopathy score or on the Affective or Interpersonal dimension scores.

6.7 Relation between psychopathic traits and psychiatric disorders in female outpatients (V)

Psychopathy is known to relate to general psychopathology (Willemsen and Verhaeghe, 2012), and, in line with this, girls' psychopathic traits associated significantly with having an ICD-10-based psychiatric disorder. The relation between psychopathic traits and externalizing disorders, including CD and ADHD, proved to be strong and resembled that reported in several previous child, male and delinquent samples. On the dimensional level, CD and ADHD both associated significantly with deficient affective experience, as well as with an impulsive and irresponsible lifestyle.

Unlike the Swedish study among female mid-adolescent substance abusers (Hemphälä and Tengström, 2010), the present study found a significant association between psychopathic traits and suffering from a depressive disorder. Looking more closely, it was the underlying behavioral component, which associated significantly with this disorder. In adolescence, a major depressive disorder is often characterized by a tendency toward irritable mood. The DSM classification (APA, 2013), for example, defines it as "persistent anger, a tendency to respond to events with angry outbursts or blaming others, or an exaggerated sense of frustration over minor matters." Thus, this finding may reflect a genuine personality trait, but it may mirror the depressive symptomatology itself, only mimicking psychopathy. If the latter were the case, one

might expect the psychopathy score to diminish with recovery of depression. Depression is highly related to suicidality (Marttunen et al., 1991), and, in girls, the behavioral component of psychopathy syndrome contributes to both suicide attempts and other self-injurious behavior (Javdani et al., 2011). The affective component, in contrast, confers protection from suicide attempts (Javdani et al., 2011). In this study, no significant association was observed between the Affective dimension of the psychopathy syndrome and having a depressive disorder.

Like the Swedish study (Hemphälä and Tengström, 2010), no significant associations between psychopathic traits and having an anxiety disorder or eating disorder were observed.

6.8 Psychopathic traits in girls charged with serious violent offenses (VI)

In line with earlier studies by Campbell et al. (2004) and Salekin et al. (2005), delinquent girls and boys who had committed comparable crimes were also comparable regarding their psychopathic traits. In this study, about two-thirds of both genders showed elevated psychopathic traits and one-third exhibited high traits of psychopathy. Our findings contradict those of Sevecke et al. (2009) and Penney and Moretti (2007) who reported that boys show higher psychopathic trait scores than girls. In both of those studies, however, boys had a history of more numerous violent offenses than girls. The gender difference in severity of offending likely contributes to the differences seen on psychopathy scores.

Even if no statistically significant gender difference was observed on the PCL-YV total scores, girls scored significantly lower than boys on the Antisocial factor. With regard to items, girls expressed significantly lower levels of stimulation-seeking, impulsivity, and irresponsibility, as well as poor anger control, early emotional problems, and criminal versatility. However, their relationships showed significantly higher instability, which is one of the core symptoms of borderline personality disorder, which is overrepresented among incarcerated women (Nee and Farman, 2005). Although psychopathy syndrome is often represented as a unitary construct, it shows heterogeneity with different subtypes and multiple underlying trait dimensions. In adults, preliminary findings indicate the existence of an antisocial personality disorder variant as well as a borderline personality disorder variant of psychopathy, the latter being more prevalent in

females (Sprague et al., 2012). The results of the present study hint that the same kinds of gender-specific trait variations might exist in adolescents.

Focusing on gender differences in psychopathy-related background variables, only victimization by sexual abuse reached statistical significance. Thirty six percent of girls, but none of the boys, had reported childhood sexual abuse, which is in agreement with earlier research reporting that this phenomenon is more common among female than male young offenders (Gore-Felton et al., 2001). In a large sample of Finnish community adolescents the association between victimization by sexual abuse and high levels of psychopathic traits has been demonstrated, and the relation was stronger in girls than in boys (Saukkonen et al., 2016b). Victimization by sexual abuse in childhood is associated with many kinds of psychosocial problems, including violence (Cutajar et al., 2010; Gammelgård et al., 2012; Gore-Felton et al., 2001; Scott et al., 2010). In fact, it has been suggested that among high-risk girls victimization by sexual abuse might be a better predictor for future violence than psychopathic traits, and that victimization may actually be an etiological factor for elevated psychopathic traits, or traits that mimic psychopathy (Odgers et al., 2005).

The majority of adolescents had committed their index crimes under the influence of alcohol. This finding is in agreement with earlier reports stating that alcohol misuse characterizes Finnish homicide crimes both in adults (Häkkänen-Nyholm et al., 2009) and in adolescents (Lindberg et al., 2009). Girls were, however, significantly less often under alcohol intoxication during the index crime than boys. This same gender difference has been observed in adults (Robbins et al., 2003). In line with an earlier report by Lehti (2006), the victims of girls were significantly more often family members or current or previous intimates than victims of boys. On the other hand, victims of boys were significantly more often complete strangers than victims of girls. Women's violence is typically bound to their close relationships and they often carry out their crimes in the context of the home (Magdol et al., 1997; Robbins et al., 2003). Thus, gender differences observed in adolescent delinquents resemble, in many ways, those reported in adult offenders.

6.9 Psychopathic traits from the perspective of personality pathology

As described in the review of the literature section (2.1.3), psychopathy syndrome has much in common with personality disorders, especially cluster B ones. Thus, one could view psychopathy as a disorder of personality. When it comes to adolescence, it has become increasingly clear that personality pathology already exists by this developmental stage (Shiner, 2009). In fact, personality disorder symptoms may actually be more prevalent in early adolescence than during later adolescence or adulthood (Shiner, 2009). Like personality disorder symptoms, psychopathic traits seem to be fairly prevalent during adolescence (in the present study, almost 10% of the 9th graders were self-assessed with LPE).

Personality disorder symptoms, especially cluster B symptoms, are shown to be highly stable from early adolescence to early adulthood (Crawford et al., 2001a). Psychopathic traits have also been described as fairly stable from childhood through adolescence to early adulthood (Frick and White, 2008; Loney et al., 2007; Munoz and Frick, 2007). Cluster B personality disorders show a high comorbidity to both externalizing and internalizing symptoms (Cohen et al, 2005; Crawford et al., 2001). Accordingly, psychopathic traits associate with both externalizing and internalizing symptoms, as is seen in the present study. Internalizing symptomatology, which is more prevalent in girls, can be complicated by either borderline or antisocial personality disorders (Crawford et al., 2001b; Cohen et al., 2005). Externalizing psychopathology, which is more prevalent in boys, can develop into antisocial personality disorder, especially among boys (Crawford et al., 2001b; Cohen et al., 2005).

In this study, female delinquents showed more elements of the borderline personality disorder-variant of psychopathy, whereas boys exhibited more elements of the antisocial personality disorder-variant of psychopathy. In summary, the development of psychopathy seems to resemble that of personality disorder pathology. Most likely, elevated psychopathic traits can be regarded as a transient phenomenon among some adolescents, but, in some individuals, these traits stabilize. Studies with a long enough follow-up period are needed to shed light on this important question.

6.10 Strengths and limitations of the study project

6.10.1 Strengths of the study

The good participation rate and the almost equal gender distribution of the school data were strengths of this study project. Moreover, the criminal data was nationwide. Delinquent girls and boys were matched for both age and crime, which is a unique approach. The Finnish tradition of performing thorough forensic psychiatric examinations forms a solid basis for research. Among forensic psychiatric patients, the psychopathy assessments were performed with the PCL-YV, which can be regarded as a gold standard in measuring juvenile psychopathic traits. Collaboration with the Dutch researchers made it possible to perform a cross-national study, which is still rare.

6.10.2 Limitations of the study

6.10.2.1 Study design

The study project was cross-sectional and addressed only concurrent comorbidity. Thus, the study does not answer to important questions like how various psychopathologies contribute to the development of psychopathic traits, how psychopathic traits contribute to the development of general psychopathology, or how psychopathic traits relate to prognosis. Further, this study cannot answer questions related to etiology of psychopathic traits in community youth or outpatients, since no information about their parents or adverse childhood experiences were gathered. This was done only among forensic psychiatric patients.

6.10.2.2 Samples

Both the outpatient data and the forensic psychiatric data remained relatively small. It was not possible to estimate the representativeness of the forensic psychiatric sample by comparing the number of girls who underwent the pretrial forensic psychiatric examination with the overall number of violent-offending girls during the 31-year study period. It has been estimated, however, that about 60% of under-aged individuals who are homicide suspects undergo a forensic psychiatric examination (Hagelstam and Häkkänen, 2006). The community data was collected from Kokkola city and the outpatient data from the area of Hyvinkää-Nurmijärvi-Järvenpää-Mäntsälä-Tuusula. The

reason for this was the fact that the school authorities in southern Finland did not give their permission to perform the study in their schools. Regarding the hospital area, where the outpatient data was collected, adolescents with neuropsychiatric, substance use and serious eating disorders are sent to special tertiary units, not to secondary care adolescent psychiatric outpatient clinics. Because of this division of labor, alcohol use disorders, which are relatively common in adolescents, were not represented. The Dutch sample had been collected almost ten years earlier than the Finnish data. It is difficult to estimate if this had an effect on the results. One must also remember that the whole study project focused on mid-adolescents, and the findings cannot be generalized to other age groups.

6.10.2.3 Diagnostics

The psychiatric diagnoses of the outpatients were not based on structured diagnostic interviews, but were taken from patients' medical files. The diagnoses of delinquents were taken from their forensic psychiatric examination reports. Fortunately, in Finland, the diagnostic procedures are reliable (Isohanni et al., 1997; Pihlajamaa et al., 2008).

6.10.2.4 Self-reporting

All measurements except the PCL-YV were self-assessments, which are all more or less transparent (79, 80). Also, even before the beginning of this study project, the psychopathy self-questionnaires' ability to measure C-U traits, which have been regarded as the most important component of psychopathy, had been repeatedly questioned (Andershed et al 2002; Hare 1996; Lilienfeld and Fowler 2006; Miller et al 2011). Information received from parents or teachers, as well as from structured interviews of the participants, would have obviously strengthened the study. With regard to the LPE specifier, the assessment was based on a self-report. In clinical practice, collateral information is used to establish the criteria for the specifier to be present. Further, at least two of the four LPE criteria must be persistently displayed over at least 12 months. The APSD-SR, or any other self-assessment, does not operate within this time frame.

7 Conclusions

7.1 Main conclusions

This study project dealt with school, clinical and criminal samples of mid-adolescent youth. The focus was on psychopathic traits. The main results and conclusions can be summarized as follows:

1. The YPI is slightly better than the APSD-SR in both reliability and factor structure. Both self-assessments are somewhat weak for tapping C-U traits of the psychopathy syndrome. Again, the YPI works slightly better than the APSD-SR.

2. Both the YPI and the APSD-SR reveal substantial gender differences on psychopathic traits in mid-adolescent community youth. Boys score significantly higher than girls on overall psychopathic traits, as well as on underlying C-U traits and Interpersonal traits.

3. In community youth, psychopathic traits show positive correlations with externalizing as well as internalizing problems. The gender differences in these correlations are minimal.

4. Limited prosocial emotions are common in community youth, and the specifier – as measured with a self-assessment – does not distinguish adolescents with subjective psychosocial problems from adolescents who do not suffer from these problems.

5. Cross-national differences exist in juvenile psychopathic traits. Caution is needed in generalizing national values.

6. Treatment-seeking girls with psychiatric disorders differ from community girls in psychopathic traits; girls with externalizing disorders show more C-U traits than girls in the community, and patients with either an internalizing or externalizing disorder show more behavioral traits of psychopathy syndrome than girls in the community.

7. In treatment-seeking girls, psychopathic traits are associated with having any psychiatric disorder, a depressive disorder, ADHD, and a conduct disorder.

8. Although violently offending girls and boys do not differ on psychopathy total scores, girls are less antisocial. Girls' interpersonal relationships are more unstable and they more often exhibit a history of child sexual abuse. Their victims are more often family members or current or ex-intimates.

9. Screening psychopathic traits as part of a psychiatric examination is relevant, especially among adolescents with externalizing disorders. These adolescents are known to be prone to drop-out from mental health treatment and they need plenty of support to continue it. Their conduct-disordered behavior is often more serious and they need more intensive treatment interventions than their counterparts without these traits. Regarding child welfare services, adolescents with high traits of psychopathy are more prone to escape from child welfare institutions, which is important to keep in mind when choosing his/her place to stay. The institution must also be able to tolerate his/her behavior, which might be exceptionally burdensome including, for example, recurrent violence and/or manipulation.

7.2 Future directions

This thesis reports novel findings on psychopathic traits in Finnish youth. More research is obviously needed, especially among female and non-offending samples, as well as in samples with different age ranges, cultures and ethnicities. Longitudinal studies are necessary to clarify how various psychopathologies contribute to the development of psychopathic traits, or vica versa. Further, clinical intervention studies are needed to shed light on the important question of how to help adolescents with psychopathic traits and maladaptive behavior. Along with the introducing of the DSM-5, this need became even more urgent. Also, new, more sophisticated instruments to measure juvenile psychopathic traits should be translated to Finnish and their psychometric properties should be studied before their wider use. In clinical work, the ideal situation would be that Finnish mental health professionals would have the skills to recognize adolescents with high traits of psychopathy and understand their special needs.

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